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FOUNDED BY DR. MAX THOREK

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Vol. 35 MAY, 1961 No. 5

Abdominal Surgery

Metastatic Carcinoma of the Spleen

Report of a Case

KINGO YAMAGUCHI, M.D., SABURO ENDO, M.D.,
KOICHI YOSHIDA, M.D., AND YUTAKA SHIBOTA, M.D.

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A case of metastatic carcinoma of the spleen is reported. The primary lesion was an adenocarcinoma of the left ovary, which had been removed three years and ten months prior to detection of the splenic metastasis.

THE CASE here reported is unusual in that a metastic malignant tumor, the primary source of which was an ovarian carcinoma, developed in the spleen and became enlarged to such proportions as to be clinically palpable.

REPORT OF CASE

A woman aged 55 had undergone, three years and ten months prior to the consultation that led to our acquaintance with her case, an operation for fibromyoma of the uterus and left ovarian cyst. She complained of anorexia, fatigue and pain over the left hypochondrium, all of seven months' duration. Because of anemia and splenomegaly she was admitted to the Department of Internal Medicine (Prof. Dr. S. Yamagatu), Tohoku University School

Submitted for publication Nov. 2, 1960.

of Medicine, two months prior to the time of writing. She was transferred to the Department of Surgery (Prof. Dr. M. Muto) with a diagnosis of metastatic carcinoma of the spleen as indicated by biopsy.

Physical Examination. — The patient was fairly well nourished but anemic. The temperature was 36.7 C. The blood pressure in millimeters of mercury was 105 systolic and 62 diastolic. There were 3,370,000 erythrocytes and 7,800 leukocytes per cubic millimeter of blood, with 68 per cent hemoglobin. The hematocrit reading was 38 per cent; the sedimentation rate was 23 mm. in one hour and 30 mm. in two hours (Westergren). No lymph nodes were palpable in the neck, and no clinical abnormalities were detected in the heart or the lungs. The abdomen was flat. There was some tenderness over the left hypochondrium, where a hard, fist-sized tumor was palpable. The tumor showed no notching of its margin.

Laboratory Studies.—The urine showed a trace of albumin. The blood Wassermann and Kahn reactions were negative. Tests of liver function gave results within normal limits. No signs of pyloric stenosis or intestinal obstruction were observed, although the stomach was pushed toward the right by the tumor.

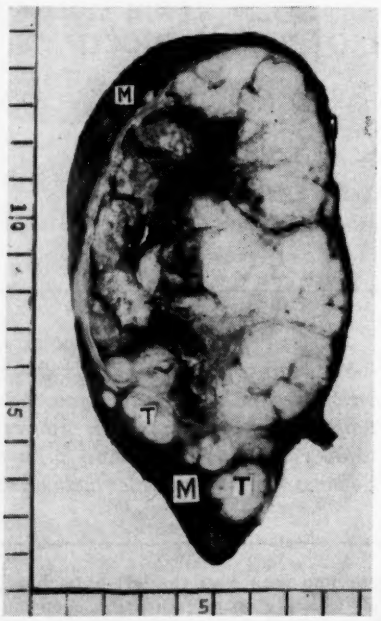

Fig. 1.—Cut surface of specimen, showing grayish nodular tumor tissue in splenic parenchyma (M). Note several small nodules (T) in parenchyma.

Operation.—With the patient under general anesthesia, a left combined subcostal-pararectal incision was made. The tumor was a spleen enlarged to the size of a child's head. The diaphragmatic and posterior surfaces of the tumor were smooth and showed the brownish color of the splenic parenchyma. On the median side of the tumor several yellowish nodules were present. The central portion of the tumor was softened and was fluctuant on palpation. The tumor as a whole was adherent to the gastric fundus, to the tail of the pancreas and, very tightly, to the retroperitoneum. The uterus and both ovaries had been removed. There were many enlarged lymph nodes along the left common iliac artery, the abdominal portion of the aorta and the hepatic artery. Splenectomy was performed, the tumor being considered either a metastatis to the lymph nodes around the splenic hilum which had grown enormously, compressing the splenic parenchyma, or a metastatic growth within the spleen, expanding outward. No signs of metastasis of the liver or of carcinomatous peritonitis were detectable.

Pathologic Picture.—The specimen consisted of a firm, globular tumor measuring 14 by 15 by 7.5 cm. and weighing 835 Gm. The surface was smooth and revealed, through the thin capsule, greyish yellow tumor tissue almost completely replacing the normal splenic tissue. On section of the spleen, an expansively growing, greyish-white medullary tumor was observed, which compressed remnants of the normal tissue toward the periphery. The central portion showed a large area of necrosis and multiple hemorrhagic foci. Within the parenchyma, along the periphery, there were several small greyish nodules and also some areas of infarction (Fig. 1).

Microscopic.—Microscopic examination of the tumor tissue (Fig. 2) revealed the typical structures of papillary cystadenocarcinoma. The histologic picture was identical with that of the ovarian cyst removed three years and ten months earlier (Fig. 3).* The central portion of the tumor showed extensive areas of necrosis and hemorrhage. The remnants of the parenchyma noted in the periphery showed atrophy and narrowing of the sinuses. These characteristics were most prominent in the hilar region, but there was also a narrow rim

*This photograph (Fig. 3) is presented by courtesy of Dr. Takanobu Konno, Chief of the Department of Gynecology and Obstetrics, Katta Public Hospital, Shiroishi, Japan.

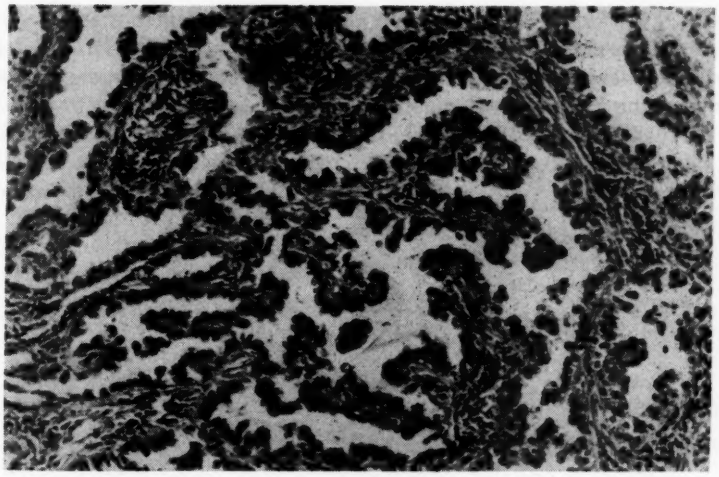

Fig. 2.—Section of tumor tissue reveals typical papillary cystadenocarcinoma, which agrees with histologic structure of primary lesion (Fig. 3).

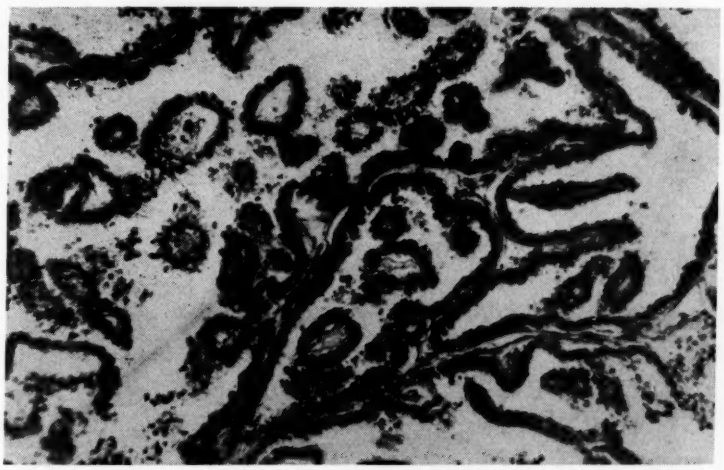

Fig. 3.—Histologic structure of primary lesion, adenocarcinoma of left ovary.

of pulp between the tumor and the capsule (Fig. 4). In addition to the grossly visible tumor nodules, there were numerous microscopic clusters of tumor cells within the splenic parenchyma. In one of the sections, groups of tumor cells appeared within a sinus (Fig. 5). Sections from a hilar lymph node and the omentum revealed only reactive inflammatory changes.

COMMENT

It has been generally accepted that metastatic carcinoma of the spleen is uncommon. Incidences reported in the literature are as follows: 0.8 per cent by Iwanaka,[1] 1.76 per cent by Yokohata,[2] 2.1 per cent by di Biasi,[3] 2.3 per cent by

Hirst and his co-workers,[4] 3.6 per cent by Herbut and his associates,[5] and 4 per cent by Warren and others,[6] while some other statistics which show a higher incidence, such as 9 per cent, reported by Abrams and others[7] and 10 per cent reported by Furuta and his associates.[8]

These figures, however, apply mainly to cases in which there were microscopic foci of metastasis in the spleen in the terminal phase of generalized carcinomatosis. Although Kraft[9] and Sappington[10] described a case, it seems extremely rare that a metastatic growth of the spleen reaches such a huge size as to be clinically palpable.

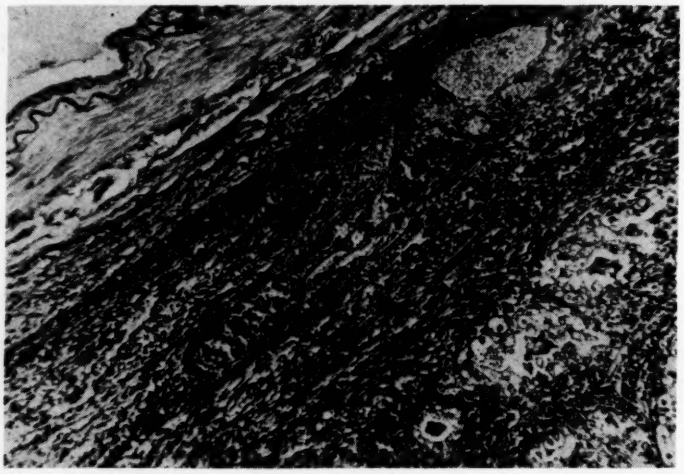

Fig. 4.—Atrophic but still preserved parenchyma of spleen between tumor tissue and capsule.

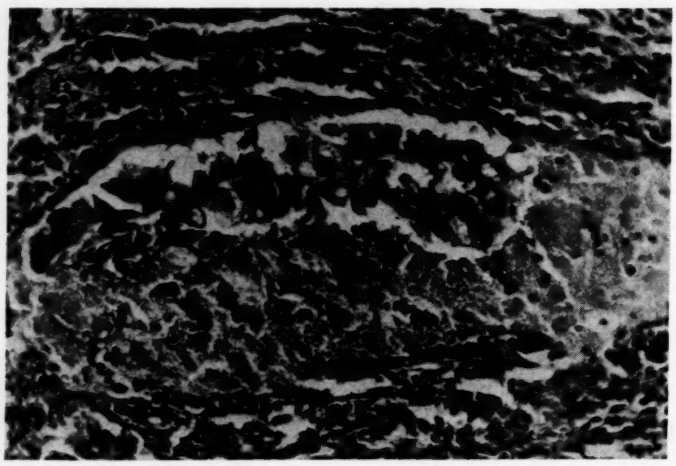

Fig. 5.—Metastatic tumor cells in sinus of spleen.

In the case here reported it was assumed preoperatively that the tumor of the left hypochondrium was a metastasis of the ovarian carcinoma that had been removed three years and ten months earlier. The clinical examinations suggested that the palpable mass could be an enlarged spleen.

As has been mentioned, metastatic carcinoma of the spleen is rarely observed even at autopsy, and it is quite uncommon that a metastatic growth of the spleen grows to such a size as to be clinically palpable. Accordingly, clinical interest in this case depends on whether the tumor was a metastatic growth in the spleen or a mass composed of metastatic hilar lymph nodes. From the observations at operation and from gross and microscopic pictures of the specimen, together with identical observations in the primary lesion of the left ovary, it is clear that the case represents the rare occurrence of splenomegaly due to a metastatic carcinoma of the spleen.

ZUSAMMENFASSUNG

Es wird über einen Fall von metastatischem Karzinom der Milz berichtet. Die primäre Geschwulst war ein Adenokarzinom des linken Eierstocks, das drei Jahre und zehn Monate vor Entdeckung der Milzmetastase reseziert worden war.

RÉSUMÉ

L'auteur décrit un cas de carcinome métastatique de la rate. La lésion primaire était un adénocarcinome de l'ovaire gauche, qui avait été extirpé trois ans et dix mois avant la découverte des métastases spléniques.

RESUMEN

Se describe un caso de carcinoma metastásico de bazo, procedente de un tumor de ovario izquierdo que se había extirpado tres años antes.

SUMARIO

Relata um caso de carcina metastático do baço. A lesão primária foi um adenocarcinoma do ovário esquerdo, que foi removido três anos e dez meses antes da descoberta da metastase esplenica.

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Only presidents, editors and people with tapeworm have the right to use the editorial "we."

When a man's talk is commonplace and his writings uncommon, it means that his talent lies in the place from which he borrows it, and not in himself.

—*Montaigne*

The Phlebographic Semeiology of Portal Alterations

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SYSTEMATIC investigation of the portal area by means of transparietal splenoportographic study, as developed in the Surgical Clinic of Turin, has enabled us to assess with fair accuracy the types of venous alteration caused by various lesions that occur in a number of diseases of the upper part of the abdomen. These portal alterations may be primary, e.g., congenital anomaly and thrombosis, but more often they are secondary to lesions of the liver or of other organs adjoining a root or the trunk of the portal region. It can be said that, from a practical point of view, the venous alterations present almost the picture of a portal disease, on account of the fairly clear angiomorphologic features, which have a different appearance from that of the initial pathologic lesions. In fact, alongside the various pathologic lesions one may detect pathognomonic and angiographic characteristics. Some of these, such as the angles formed by the portal segments and the diameter and length of the vein, are large enough to be measured and can therefore be compared with either normal or pathologic values.

Assessment of the pathologic angiographic picture demands, of course, a thorough knowledge of the normal one.

Splenoportal Morphologic Picture on Angiographic Study.—The morphologic character of the splenoportal vascular bed can be revealed by roentgenograms of the vascular anatomic pattern. Although the full position proper to the taking of the films cannot be obtained, the topographic

From the Surgical Clinic (Prof. A. M. Dogliotti, Director), University of Turin.
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The phlebographic picture in the presence of a number of conditions involving alterations in the portal vein is described, on the basis of work done at the Surgical Clinic of Turin by a transparietal splenoportographic method developed there. The morphologic character of the splenoportal vascular bed is described, and alterations therein, both congenital and due to disease, are discussed. The angiographic appearance of portal hypertension is outlined.

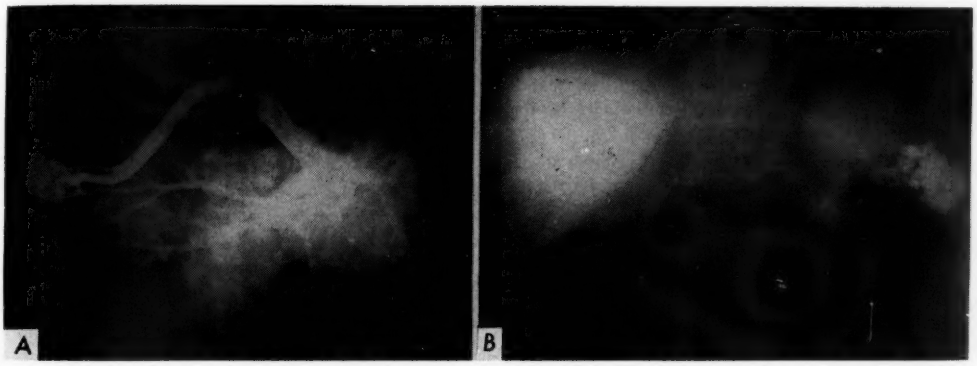

Fig. 1.—*A*, normal splenoportogram. *B*, normal splenoportogram (capillary phase).

aspects of the angiogram correspond closely enough to the true one.

The arrangement of the portal vessels is revealed by a roentgenogram taken at the moment when the entire venous system, from the spleen to the small intrahepatic ramifications, can be visualized by means of the contrast medium. It can therefore be analyzed independently of the progress of the medium, and in theory it can be obtained by taking a single angiogram if this can be made to coincide with the particular moment (which is very short in normal conditions) when opacification of the vascular area is complete.

In analyzing the splenoportal angiographic morphologic aspect of the splenoportal area, one must bear in mind the various arrangements of the vascular system that may be observed even in the physiologically normal. The angiographic picture reveals the structure of the *extrahepatic and intrahepatic* portal systems. In normal persons splenoportograms enable one to visualize the portal trunk of the extrahepatic portal system and of one of its two roots (the splenic vein), while the other two roots (the mesenteric veins) are not opacified; visualization of the latter is a pathologic sign.

The normal arrangement of the vessels of that portion of the extrahepatic portal system which is splenoportographically visualized can be recognized by the angiographic morphologic appearance of the splenic vein from the point of injection to the splenoportal juncture and of the portal vein itself to its point of bifurcation (Fig. 1, *A* and *B*; see also table).

Certain Normal Angiographic Measurements

Angiographic Measurement	*Mean*
Length of splenic vein, cm.	12 ± 1
Length of portal trunk, cm.	5.5 ± 0.75
Diameter of splenic vein, mm.	10 ± 1.5
Hepatodistal diameter of portal trunk, mm.	15.5 ± 3.5
Intermediary diameter of portal trunk, mm.	14.5 ± 2.5
Hepatoproximal diameter of portal trunk, mm.	14.5 ± 2.25
Splenohorizontal angle	42° ± 16°
Splenoportal angle	115° ± 22°
Portovertebral angle	50° ± 11°
Angle of bifurcation	115° ± 19°

The contrast medium also reveals the entire splenic vein, along which it flows from the spleen through one or more branches of the hilum. A splenoportogram generally enables one to visualize one or two, and occasionally three, hilar roots; often one large branch and one or more rather thin branches may appear. The true splenic vein begins at the junc-

ture of the hilar roots and generally has a rather irregular and winding course. The angle of the splenic vein to the horizontal plane may increase or decrease within certain limits. This angle, which averages 40 degrees, is diagnostically important, since an exceptional increase in its size is generally a pathologic sign.

The average diameter of the splenic vein is 11 mm. and the average length 8 or 9 cm.

The juncture of the splenic vein with the portal trunk is particularly clear on the radiogram, since the two vessels form a very distinct angle (average, 115 degrees). At the level of this angle the upper mesenteric vein flows in, but this is not normally seen on the splenoportogram, and only the outline of the right edge may appear, looking like a radiopaque point turning downward. On the other hand, the mesenteric flow reduces opacity at the level of the portal trunk or simply causes failure to fill, which produces an image like a candle flame a few centimeters long.

The topographic character of the splenoportal angle can be assessed in relation to the vertebral column. On the transverse plane it can be assessed from the corresponding vertebra or intervertebral space. On the sagittal plane it can be assessed from the medial line of the vertebral column. In the normal arrangement the splenoportal angle is projected on the vertebral shadow; less often it is to be seen near but outside this shadow. In physiologic conditions, the usual position of the juncture corresponds to the projection of the first lumbar vertebra and of the intervertebral spaces above and below, and it generally appears to the right of the medial line. The degree of angulation here has definite diagnostic significance, since pathologic alterations of the liver are often accompanied by displacement of the portal axis and increase or decrease of the angle itself.

The portal trunk, which is relatively straight, though sometimes slightly curved and about 6 to 8 cm. long, may show alterations in size between its splenomesenteric point of origin (hepatodistal diameter) and its termination at the bifurcation (hepatoproximal diameter). Generally the size of the vessel is reduced near the bifurcation; less often it is smaller at the point of origin or is fusiform, with an enlarged diameter "in between." The direction of the portal axis is important for diagnosis, since it may vary in the presence of hepatic disease, as has already been mentioned. The direction of the portal trunk is shown by the angle its axis forms with the rachidian axis (the portovertebral angle, average 50 degrees).

The portal trunk ends by dividing into a left and a right branch. This is the normal termination of the portal vessel, but occasionally it divides into three, two branches going right and one going left. The most frequent position of the bifurcation in relation to the vertebral column is at the spinal segment between the twelfth dorsal and the first lumbar vertebra. When they divide, the left and right portal branches form an angle of 115 degrees on the average, but this may be considerably greater if the liver is enlarged owing to tumors or cysts.

The left and right portal branches enter the liver and give rise to the network of the intrahepatic portal system.

In the angiographic morphologic picture of portal vessel, the right portal branch seems to continue in the direction taken by the trunk, to divide into the central upper and lateral veins after a short course (1 to 3 cm.). The central upper vein runs out perpendicularly from the right portal and has various roentgen anatomic characteristics. When the axis of the vein coincides with that of the roentgen rays, it appears as a dark roundish spot from which the collateral vessels radiate; or it

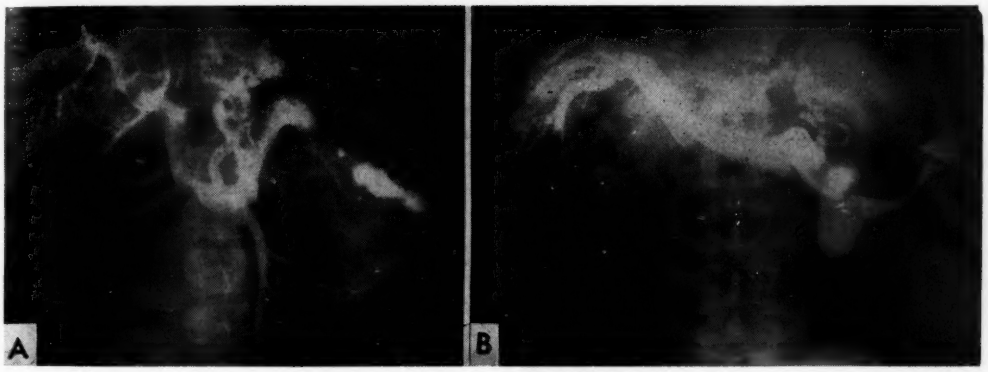

Fig. 2.—*A*, partial congenital stenosis of the portal vein: hepatofugal collateral circulation. *B*, congenital perviousness of Aranzio's duct.

appears as a vessel with a clearly ascending and often curved course, or else it flows back, at first descending and then, after a sharp bend, ascending or curving, and terminating with a tuft of collaterals. Even in the latter two arrangements, the central upper vein in its initial course appears very dark, owing to the fact that the vessel is superimposed on the right portal branch. The short course of the right lateral vein, before its division into an upper lateral and a lower lateral vein, often cannot be seen, because it is superimposed upon by the central upper vein. This deformity often gives a false picture of trifurcation of the right portal branch. In some cases, however, the angiographic trifurcation is real. The upper lateral vein describes an ascending concave arc, while the lower lateral vein diverges from it and follows an almost symmetric descending course. Both situations are clearly revealed on the angiogram, because of the size of the veins.

The left portal branch runs out at a much clearer angle from the trunk and follows a horizontal or slightly oblique course on a relatively long tract (2 to 7 cm.). On account of the bend formed at the level of the groove of the ligamentym teres, it often follows the axis of the roentgen rays, and its final course therefore appears as an extremely dark roundish spot (Rex's recess) or has a descending course. The upper lateral vein seems to be the continuation of the left branch, while the lower lateral vein, underlying the former, departs from Rex's recess and generally follows a curve concave at the top, or else it appears to continue the descending tract of the main portal branch toward the left. The group of paracentral veins often shows a thick branch going downward and inward from Rex's recess.

Finally, the angiogram reveals the outline of the branches of the second and third order, which run out at a very wide angle. The ramifications of the fourth order are difficult to see in splenoportograms.

Morphologic Alterations.—The pathologic modifications of the splenographic morphologic picture, which depend on the site and type of the disease, include *strictly morphologic alterations* of the venous tree (congenitally abnormal vascular arrangements; alterations of site, course and diameter; avascular areas and intrahepatic pathologic circulation) and *angiographic evidence of portal hypertension* (vascular dilatation and collateral circulation).

Whether these are primary or second-

ary, the strictly morphologic alterations are essentially *congenital alterations* and *alteration of site, course and diameter.*

The *congenital alterations* of the portal vein vary in site, origin and phlebographic appearance: splenoportographic study has enabled us to discover them more often thus than the results of clinical examination and the often late appearance of the symptoms would lead one to expect. On the basis of the site and characteristics of the vascular area it is possible to distinguish the congenital alterations of the portal trunk from those of the portal roots. The precise pathogenic nature of the vascular malformations is not easy to establish; nevertheless, it may be explained by the appearance of alterations during embryonic development and by the persistence of vascular segments belonging to fetal circulation.

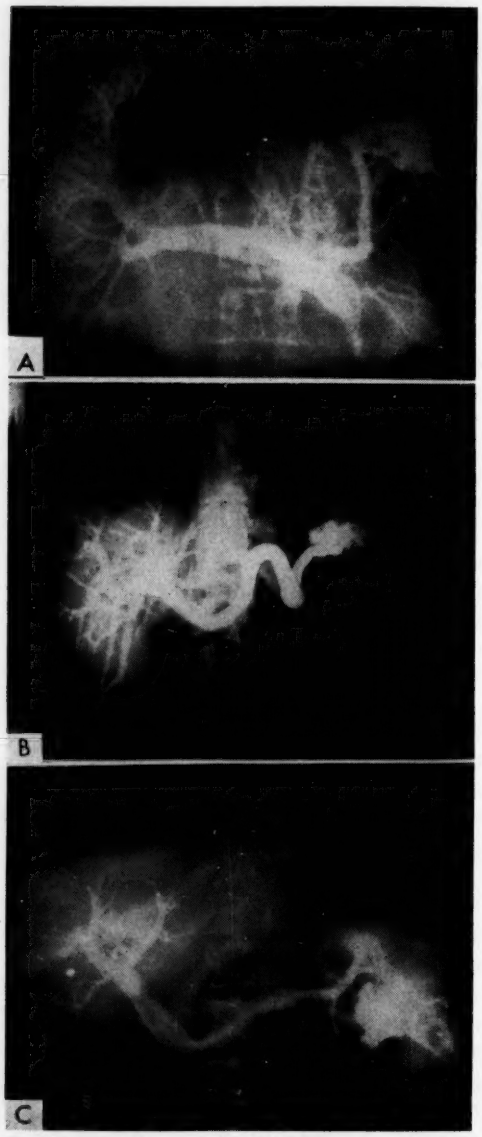

Fig. 3.—*A*, intra-extrahepatic tumor: dislocation of entire system and hepatic avascular area. *B*, cirrhosis of liver at initial stage; splenic twisting. *C*, cirrhosis of liver at advanced stage; reduction and shortening of intrahepatic portal bed.

The abnormalities of embryonic development consist of the persistence of venous channels that should normally become atrophied, or extension of the obliterative processes beyond their normal limits. Omitting serious or rare abnormalities, such as an outlet of the portal vein into the cava or right atrium and agenesia of the portal vein itself, there is the possibility of intrahepatic or subhepatic direct portacaval shunts, and of the existence of two portal veins and portal stenosis.

In direct portacaval shunts, the splenoportogram shows a fairly large vein that originates at the splenoportal juncture, proceeds in a cranial direction and, beyond the diaphragm, runs to the right of the vertebral column alongside the vena cava, the outline of which is sometimes shaded in such cases. When two portal veins are present the angiogram shows a venous trunk running clearly parallel to the portal vein and generally thinner than the latter, coming out at the level of the splenoportal juncture and going toward the left intrahepatic area, whose branches it subsequently joins. In some cases, however, this angiographic picture is due to a vascular arrangement resulting from pathologic dilatation of a hepatopetal collateral branch

of the small omentum. Stenosis of the portal vein is characterized by a clear narrowed vascular area with regular outlines, often funnel-shaped, in the critical sites of embryonic development. When portal stenosis is incomplete, the contrast medium presents a typical "hourglass" picture (Fig. 2*A*).

Congenital alterations of the portal vein due to persistence of segments belonging to the fetal circulation consist of perviousness of the umbilical vein and of Aranzio's duct. The splenoportogram enables one to determine the characteristics of the pervious umbilical vein with great accuracy. This appears as a large vessel continuing the left portal branch and describes an arc concave at the bottom; it then follows a fairly twisting course, running caudally and medially. Sometimes the vessels of the para-umbilical circulation are also visualized, while the right portal branch appears short and thin and the intrahepatic blood supply extremely small. The perviousness of Aranzio's duct, on the other hand, is revealed by the persistence of a venous shunt running from the left or right branch of the portal vein directly into the inferior vena cava. The phlebogram reveals a large vessel that appears to be a continuation of one of the portal branches, generally the left; after a short ascending course this vessel loses its opacity, probably at the level of its entry into the vena cava. The latter may then be very slightly shaded (Fig. 2*B*).

Congenital alterations of the portal roots generally include abnormal outlets of the splenic vein, of its tributaries or of the mesenteric veins.

The *alterations in site* of a vascular section reveal the direct action of the anatomopathologic lesion or else indirect adaptation of the venous system to a lesion involving adjoining sections; vascular displacement may therefore be either limited to a single section or involve successive sections. The alterations of site localized by

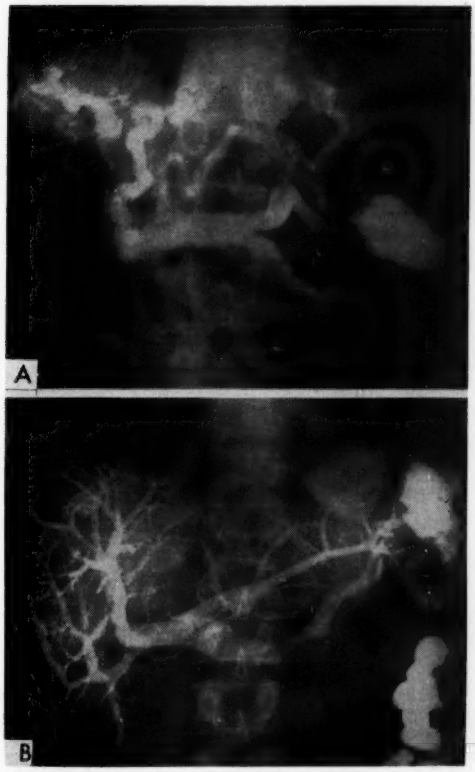

Fig. 4.—*A*, partial thrombosis of portal trunk: hepatofugal collateral circulation. *B*, tumor of pancreas; partial splenic compression.

direct action of the anatomopathologic lesion are generally the result of enlargement, viz., because of tumors, cysts or abscesses. These may be implanted on the extrahepatic portal vein, but their appearance on the intrahepatic portion has greater diagnostic importance (tumors and cysts of the liver). Direct dislocations of the extrahepatic portion of the portal vein can be seen both on the trunk and on the splenic vein in the presence of diffuse neoplastic processes, such as lymphoglandular metastases of the hepatic hilum, diffuse abdominal metastases, metastatic carcinoma of the pancreas, large renal tumors or cystic formations (cysts or pseudocysts of the pancreas; see Fig. 3*A*).

Alterations due to indirect adaptation are less obvious and can be detected only after careful comparison. The most clearly revealed are those due to enlargement of the liver.

Alterations of the course consist of shortening, lengthening or twisting of certain vascular segments. Angiographic alterations due to vascular shortening are limited almost entirely to the branches of the intrahepatic portion of the portal vein (Fig. 3, *B* and *C*), and are observed in association with fibrosis of the liver as a result of progressive strangulation of the vessels caused by connectival proliferation. Angiographic alterations due to lengthening affect only the intrahepatic portion of the vein and are generally associated with diffuse hypertrophy of the liver or hepatomegaly due to cholostasis, etc., as a result of stretching of the vessels *resulting from* enlargement of the organ. To a great extent, a winding vascular course is a typical angiographic characteristic of the splenic vein and occurs especially in the presence of splenomegaly. In fact, splenomegaly displaces the hilum of the spleen either craniocaudally or toward the medial line, thereby causing the splenic vein to adapt itself to the new situation. A splenic vein with a winding course is often accompanied by an apparent and sometimes real lengthening of the vessel.

Fig. 5.—Tumor of pancreas; total splenic compression with hepatofugal collateral circulation.

Alterations in the diameter consist of either increase or decrease. Decrease of the vascular diameter may be limited to a portal section or may extend to the whole system. The second condition is observed almost exclusively in cases of constitutional hypoplasia or in the more advanced stages of atrophic cirrhosis. Decrease in size, limited to a venous segment, is much more frequent, however, and is the result of fairly extensive vascular compression due to any one of a variety of diseases. The angiographic picture of such a decrease often appears when the film shows a real defect in filling. Nevertheless, one can distinguish the two angiographic signs by the general appearance of the venous segment concerned. In the first instance it appears regularly thinned out, with regular vascular outlines, and in the second it is irregularly opacified, with irregular vascular outlines.

Partial thinning of the intrahepatic branches sometimes occurs in cases of hepatic enlargement (cystic formations and neoplastic processes). Decrease limited to the extrahepatic portion of the vein may be due to a congenital lesion (stenosis or vascular hypoplasia) or to gradual and continual compression (e.g., by cysts and pseudocysts of the pancreas). In the majority of cases, neoplastic processes (carcinoma of the pancreas, stomach, hepatic hilum, biliary tract, etc.), inflammatory processes (e.g., pancreatitis) and, above all, thrombosis, cause a real defect of opacification, extending to apparent vascular amputation. The filling defect is clearly revealed by an irregular and fairly exten-

sive "negative" patch at the level of the contrast column. The vessel is clearly decreased in size, while its outlines have lost their normal morphologic appearance. They appear indented or recall particular angiographic pictures such as the "raill" picture in the presence of thrombosis, with partial perviousness of the vessel between the thrombus and the venous wall; the "hourglass" picture may be observed if there is bilateral compressions, or the "niche" picture if the compression is unilateral. Sometimes the filling defect is revealed by thinning of the contrast medium at one point. Filling defects, even though only partial, suggest perviousness of the vascular segment involved; when the compression or a thrombotic process occludes the vein, the angiographic picture of vascular amputation appears. Vascular amputation is characterized by arrest of the radiopaque column at the level of the segment affected. If the vessel is pervious below the occlusion and is there refilled with contrast medium by means of collateral circulation that by-passes the obstacle, then it is possible to assess the extent (generally limited) of interruption of the circulation. If, on the other hand, the filling is not achieved by collateral circulation, the area dependent on the occluded vein is not visualized (Figs. 4 to 6).

Failure to visualize a vascular segment in the hepatic parenchyma gives rise to a "negative" picture with *avascular areas* (Fig. 6*B*). The size and character of the avascular areas depend on the site and importance of the venous branch occluded. They are particularly pronounced during the capillary phase of seriographic investigation, forming highly transparent patches clearly limited by the surrounding opaque areas.

Morphologic alterations due to increase in the size of the vessels are part of the angiographic pictures of portal hypertension.

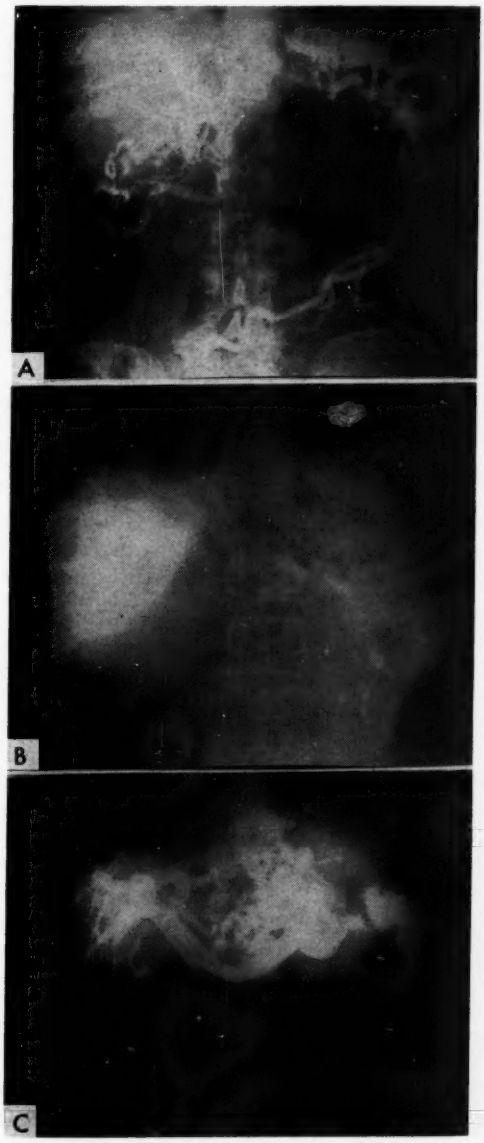

Fig. 6.—*A*, total splenoportal thrombosis; hepatopetal collateral circulation. *B*, hepatic metastases; avascular areas in capillary phase. *C*, cirrhosis of liver with portal stasis: vascular dilatation and hepatofugal collateral circulation.

The angiographic picture of portal hypertension consists mainly of partial or diffuse dilatation of the splenoportal sys-

tem and visualization of the collateral circulation. Within certain limits, even lengthening and twisting of a vascular segment may be due to circulatory stasis. Venous ectasia, and also lengthening and twisting of the vessel above the circulatory obstacle, are to be explained by the effects of hydrodynamic forces caused by venous overloading. Visualization of the collateral circulation reveals the outlets of the blood caught in the splenoportal system. These may be hepatopetal, with a vicarious function, or hepatofugal, with a derivative function (Fig. 6*C*).

Various combinations of the alterations here described are characteristic in various ways and to various degrees, according to the individual disease that causes them. Thorough knowledge and careful analysis of these changes, therefore, can have immense value in the diagnosis of a number of diseases of the upper part of the abdomen.

RESUMEN

Se describen en este trabajo los diferentes cuadros radiológicos de las enfermedades del sistema porta obtenidos mediante la esplenoportografía transparietal según un método empleado en la Clínica de Turín. Se expone al aspecto morfológico del sistema porta y sus alteraciones, tanto congénitas como adquiridas. Por último se esquematiza el aspecto radiológico de la hipertensión portal.

SUMARIO

Descrevem o quadro flebografico na presença de um certo numero de condições envolvendo alterações na veia porta, baseados em trabalho realizado na Clinica Cirurgica de Turim, que, consiste em um método esplenoportográfico transparietal lá aperfeiçoado. Descrevem o caracter morfológico do leito esplenoportográfico, e discutem as alterações, tanto congenitas quanto consequentes a moléstias. É apresentada a imagem angiográfica da hipertensão porta.

ZUSAMMENFASSUNG

Das Röntgenbild der Venen bei einer Reihe von mit Veränderungen der Pfortader einhergehenden Erkrankungen wird, gestützt auf an der Turiner Chirurgischen Klinik mit einer dort entwickelten Methode der Splenoportographie durch die Bauchwand vorgenommene Untersuchungen, beschrieben. Die morphologischen Eigenheiten des splenoportalen Gefässbettes werden dargestellt und angeborene sowie durch Krankheit hervorgerufene Veränderungen werden erörtert. Das angiographische Bild bei Pfortaderhochdruck wird umrissen.

RÉSUMÉ

Sur la base de travaux effectués à la Clinique universitaire de chirurgie de Turin selon une méthode de splénoportographie transpariétale qui y fut créée, les auteurs décrivent l'image phlébographique en présence d'un certain nombre d'états pathologiques comprenant des altérations dans la veine porte. Ils décrivent le caractère morphologique du lit vasculaire splénoportal et discutent ses altérations à la fois congénitales et pathologiques. Ils exposent aussi l'aspect angiographique de l'hypertension portale.

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In Germany and Austria, where Semmelweis might naturally have expected the readiest acceptance, his doctrine was most generally attacked. The year 1857 was particularly fertile in these assaults. Veit of Rostock declared that puerperal fever was generally the result of epidemic influences, and that Semmelweis had found few followers. Anselm Martin of Munich described a puerperal epidemic which had broken out in the newly built lying-in hospital which he administered. Martin admitted the possibility of cadaveric infection, but seemed to think it was an inadequate explanation; like so many others he was ignorant of the full extent of the Semmelweis doctrine. Joseph Spaeth of Vienna cannot, however, be excused on the ground of ignorance. On the very scene of the original discovery there were people and records readily at hand to give him whatever information he desired on Semmelweis. Yet in his *Kompendium der Geburtshilfe,* while admitting the possibility of infection by decomposed animal matter, he said not a word of the means devised by Semmelweis to prevent such infection.

With justice could Karl Braun write, in his *Lehrbuch der Geburtshilfe,* which also appeared in 1857, that the "hypothesis of cadaveric infection"—he did not name Semmelweis—had been almost entirely discarded in Germany and France.

—*Slaughter*

The Adrenal Venous System in Man

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AND

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PHILADELPHIA, PENNSYLVANIA

STUDIES of the adrenal arterial supply and venous drainage have not been numerous, and, in general, descriptions of venous drainage have been merely an adjunct to the consideration of arterial supply. Fortunately the few reports that have been made have been excellent. The study by Flint (1900) of the canine adrenal gland is still cited and depicted as a model of mammalian blood supply in many textbooks, and additional fine studies by Bennett and Kilham (1940) in the cat, Gersh and Grollman (1941) in the rat and mouse, Harrison (1951) in the rabbit, rat and cat and, more recently (1960), the Rhesus monkey, and by Lever (1952) in the rat have augmented Flint's earlier study.

Reports of the human adrenal arterial supply have been extremely rare. While the adrenal blood supply as far as the capsule has been adequately described by Gerard (1913), Anson, Cauldwell and Pick (1947) and Merklin and Michels (1958), still virtually nothing is known of the internal distribution of arteries. Our knowledge of venous drainage is also very meager, since the studies that have been made have seldom extended beyond a consideration of adrenal vein musculature (Ferguson, 1906; Maresch, 1921; Henderson, 1927; Goldzieher and Sherman, 1928; Allen, 1929; Daviolo-Marani, 1933; Bargmann, 1933; Zeckwer, 1935; Nisioka, 1940, and Heinivaara, 1954) or problems of adrenal hemorrhage and necrosis (Arnold, Richer and Lepore, 1949; Molina and Moffioletti, 1955; Plaut, 1955, and Schulz, 1957). Studies by Gagnon (1956) and Johnstone (1957), although thorough, have been restricted to descriptions of the external veins and alternate routes of drainage.

The purpose of the present report is to give a complete account of the adrenal venous system, including related peripheral veins. Some new adrenal morphologic observations will be related, and the significance of the unusual vascular arrangement of the human adrenal gland will be discussed.

Material and Methods.—Through the co-

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In a study of 155 fresh human adrenal glands, the authors have examined minutely the glandular structure and the external venous system. The pattern of the intrinsic veins was determined with the aid of latex or vinyl acetate injected into the vessels. The results are presented in detail and correlated with adrenal function and the effects thereon of various vascular pathologic conditions.

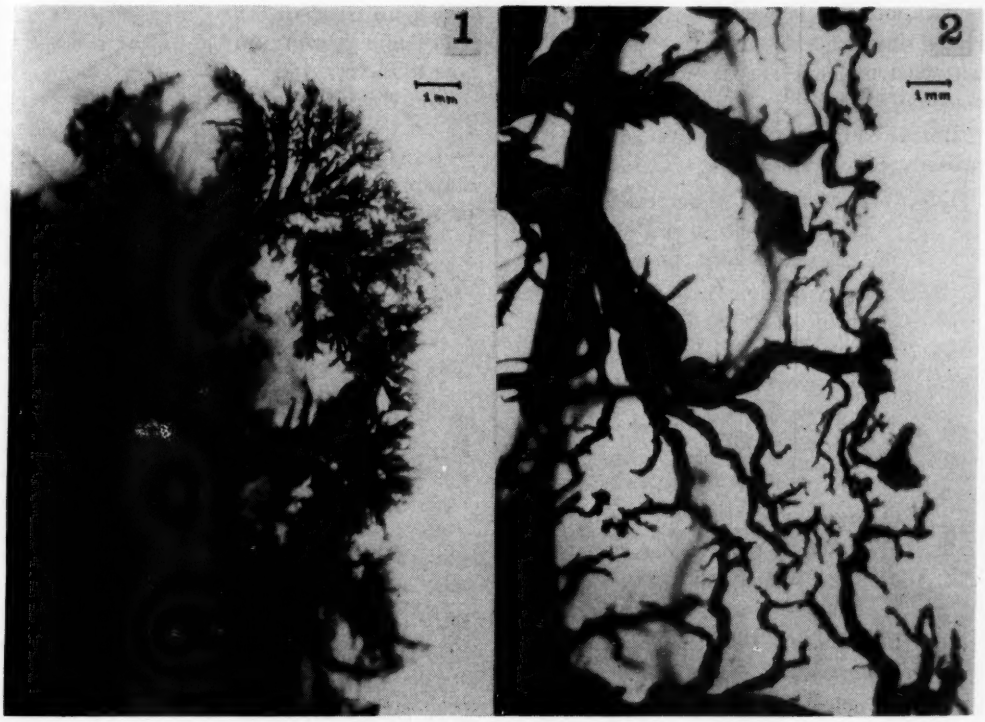

Plate I.—Fig. 1, right adrenal gland injected with latex and cleared in methyl salicylate. Venous system has filled completely. Fig. 2, left adrenal gland from a patient with hypertension, same procedure as in 1. Venous system is not completely filled; large and small veins are tortuous, and there are areas of constriction and alternate dilation.

operation of four local hospitals a large number of postmortem specimens were obtained for this study. These specimens consisted of one or both adrenal glands and a varying amount of surrounding tissue. In most cases this included the celiac ganglion, regional blood vessels, a portion of aorta or vena cava, fascia and adipose tissue. The specimens were wrapped in paper toweling and frozen until they could be studied.

At the time of examination the specimens were thawed in cold running water. The gland was identified as right or left from the position of the vena suprarenalis; larger vessels were located, their branches traced and the cut ends either clamped or tightly tied. To facilitate locating cut vessels, saline solution was injected into the larger arteries and the vena suprarenalis. This injection also served to clean the vessels and locate lacerations of the adrenal capsule suffered at postmortem removal of the specimen.

The only injection site for the venous system was the vena suprarenalis. Hand pressure of not more than 100 mm. of mercury was applied in order to prevent distention or rupture of the venous system. In addition, several small veins were left open to prevent a buildup of static pressure within the gland. At the same time the arteries of many specimens were injected for a concurrent study.

Blue latex or blue vinyl acetate was injected into the vena suprarenalis. The major adrenal arteries were injected, when possible, with latex of various other colors.

Immediately after injection one of two procedures was followed:

1. (a) Fixation in 10 per cent solution of formaldehyde or Bouin's fixation under vacuum.
   (b) Dehydration through an alcohol series under vacuum.
   (c) Clearing in methyl salicylate, cedar oil or other solutions under vacuum.
   (d) Photographing.
   (e) Imbedding in paraffin.
   (f) Histologic study.
2. (a) Immersion in 10 per cent potassium hydroxide for twenty-four hours.
   (b) Washing in tap water.
   (c) Storage of cast in 5 per cent solution of formaldehyde.

Results.—Approximately 5 per cent of the specimens did not contain adrenal tissue at all. These specimens were characteristically composed of large masses of fat in a strong, supportive framework of connective tissue; blood vessels were small and infrequent. Complete dissection to the center of the mass revealed an increased concentration of connective tissue there.

Other specimens were in poor condition. This we attribute to one of two causes: Either the subject had died after a prolonged illness or the interval between death and frozen storage of the specimen was too long.

Many additional specimens were torn. In most cases these were worthless for injection, although a few were salvaged by clamping the torn area. For one or another of these reasons, more than 50 specimens were discarded as unfit for injection. The following data are based on the examination of 105 specimens (57 right and 48 left adrenals) that were considered suitable for injection.

General Morphologic Observations: The ventral medial surface of the fresh adrenal gland is flat and usually devoid of fat. It is covered by a thin fascial sheet, Gerota's fascia (Fig. 3), which blends with the diaphragmatic fascia above and extends downward to cover the kidney below. The dorsal lateral (renal) surface has a well-developed ridge oriented to the long axis of the gland (Fig. 11). This ridge, judging by our experience with some 150 specimens, is indicative of a healthy, normal gland. Diseased or necrotic glands invariably have flat surfaces. Well-developed but easily dissected fat deposits are present on the renal surface, and commonly arteries, veins and a sizable nerve pass through the adipose tissue at either side of the ridge and are distributed to the gland. The lateralmost artery supplies the lateral border of the gland. The medial border is supplied by twigs from the inferior phrenic artery. The inferior aspect of the adrenal gland receives, in addition to blood supply from the aforementioned sources, arterial branches from the renal

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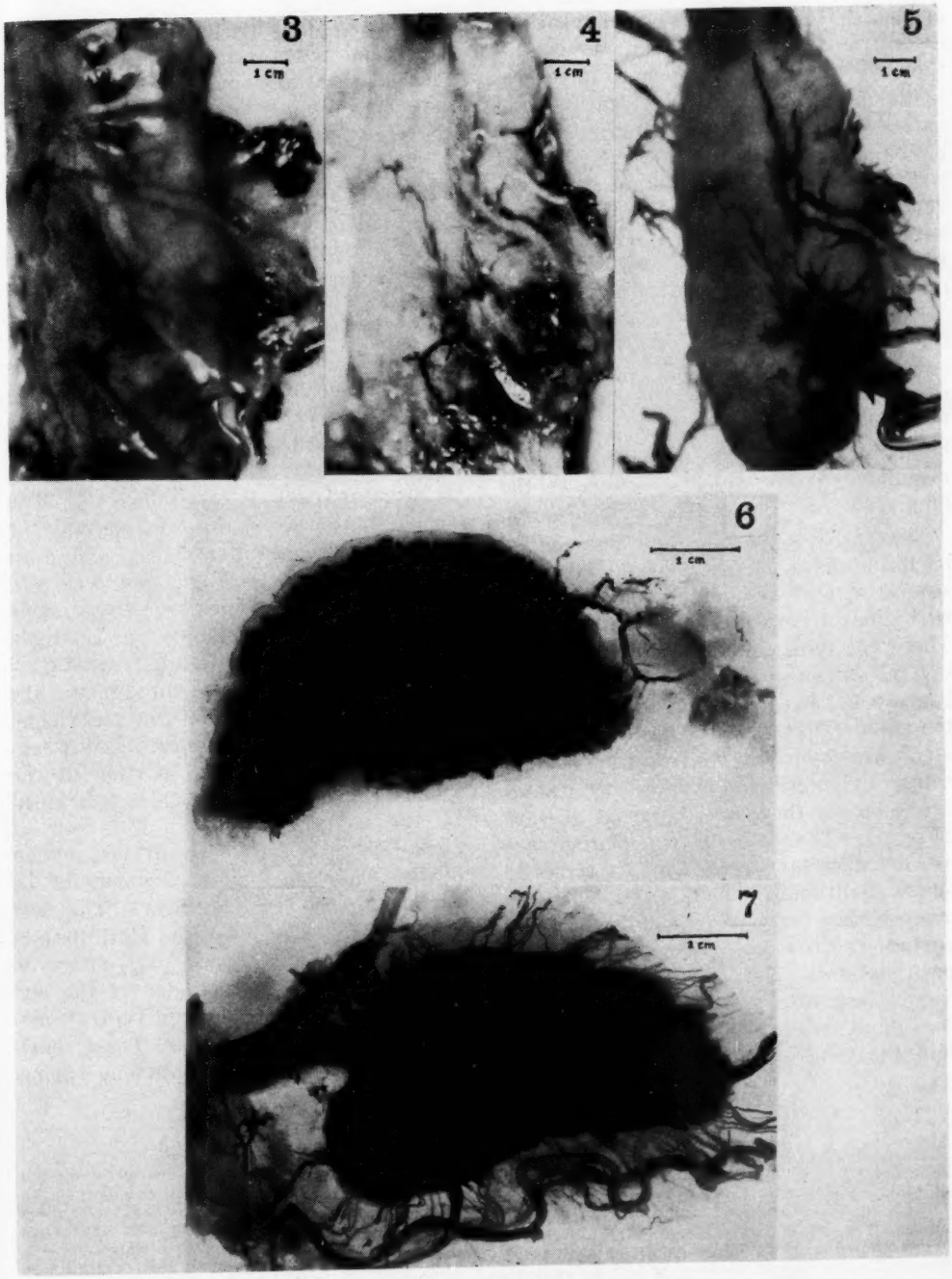
Plate II (*opposite*).—Figs. 3, 4 and 5, three steps in dissection of Gerota's fascia. All veins have filled from injection of vena suprarenalis. They are distributed to fascia, beneath fascia and on surface of adrenal gland. Fig. 3, injected veins in Gerota's fascia and beneath it. Fig. 4, venous plexus beneath Gerota's fascia. Fig. 5, adrenal gland partially cleared in methyl salicylate to demonstrate veins on adrenal surface. Fig. 6, right adrenal gland injected with latex and cleared in methyl salicylate. Celiac ganglion and lymph node are at right. Fig. 7, left adrenal, same treatment as in 6. Note sizable veins in addition to vena suprarenalis and profusion of arteries.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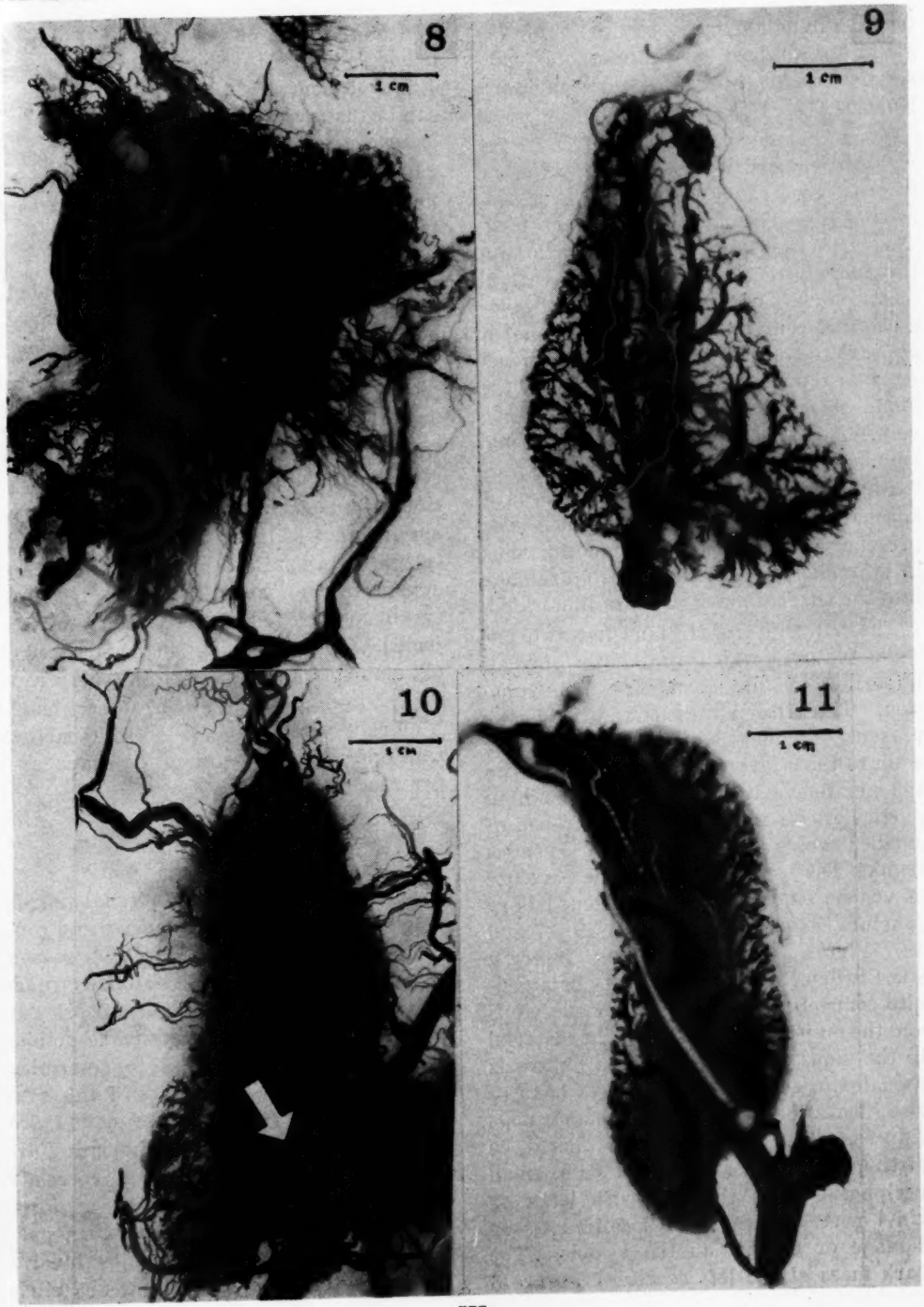
artery. No distinct fascial layer separates the adrenal gland from the kidney, although such a layer is described in several textbooks. The color of the healthy gland varies from yellow-pink to grayish tan. Shape and size vary considerably, but the left adrenal is usually foliate, with the vena suprarenalis as the stem. The right adrenal is usually rhomboid, with the short vena suprarenalis forming near the middle of the ventral medial surface. The capsule varies in thickness and may reflect the general condition of the gland.

The midpoint of the lateral border of the adrenal gland is most suitable for biopsy, for two reasons: Fewer vessels will be damaged here, and the inclusion of medullary tissue, which is scanty in the human adrenal gland, is usually assured.

Superficial Adrenal Veins: The ventral medial surface of the adrenal gland has several nets of fine veins, which blend in with similar networks on the diaphragm. These fine veins are usually distributed at several levels—in the covering fascia, beneath the fascia and on the surface of the gland (Figs. 3, 4 and 5). The various levels are joined by numerous connecting veins, and occasionally venae comitantes are seen on the ventral medial surface (Fig. 5). The veins on the renal surface are not disposed as nets but are typically venae comitantes. These veins, with the arteries they accompany, supply the renal surface and continue to the diaphragm or perirenal area. Perforating veins connect the surface veins with veins deep inside the gland, while other connecting veins join the vena suprarenalis (Fig. 5). As evidence of the widespread connections of superficial and internal veins it should be recalled that only one injection site, the vena suprarenalis, was used to fill all the veins, both external and internal.

The Intrinsic Venous System: Drainage of the human adrenal gland is accomplished through successive orders of venules and veins, which begin in the reticularis of the cortex or in the medulla. As many as five orders of vessels may be involved, with drainage ultimately reaching a major trunk. Usually three major trunks unite to form the vena suprarenalis, or, in rare cases more than one vena suprarenalis may be formed. Division of the adrenal gland into distinct segments, each drained by a major trunk, is rarely possible. The venous patterns of the left and those of the right adrenal differ widely, and, even in adrenals from the same side, what appear to be two distinct segments in one adrenal are often combined as a single unit in another gland. In addition, numerous anastomoses exist throughout the gland, even between well-defined segments. In the right adrenal the most distinct segment is the inferolateral portion of the gland (Figs. 12 and 13), which is drained by the lateralmost trunk. The ventral medial portion and the posterior portion of the gland may form segments or be combined into one segment. The left adrenal gland also has as its most distinct segment the inferolateral part (Figs. 9, 14 and 15). The remainder of the left adrenal may be divided into ventral, medial and posterior portions. These, however, are often drained by a long venous

Plate III (*opposite*).—Adrenal gland injected with latex at vena suprarenalis and cleared in methyl salicylate. Fig. 8, numerous veins associated with right adrenal gland. Excellent filling except for area at middle left, where large mass of latex formed within gland. Fig. 9, adrenal gland (left) of hypertensive patient. Incomplete filling permits clear picture of major divisions and branches of venous system. Fig. 10, dorsal surface of left adrenal gland. At lower right, inferior phrenic vein and vena suprarenalis (arrow) join. At upper left, large vein passes from adrenal gland to perirenal adipose tissue. Fig. 11, dorsal surface of left adrenal gland. Ridge on this surface is visible with large artery parallel and inferior to it. Branching artery is visible parallel and superior to the ridge.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trunk extending from the apex of the gland to its base, with numerous subsidiary trunks entering it throughout its length (Figs. 14 and 15).

Since the ventral medial surface of the right adrenal is in close proximity to the inferior vena cava, the right vena suprarenalis is rarely more than 10 mm. long. The left vena suprarenalis forms at approximately the same area on the ventral medial surface of the left adrenal but takes a slanting course to the surface, so that it appears to form at the base of the gland. At a distance of 15 to 20 mm. from the gland it joins the left inferior phrenic vein. This vein empties into the left renal vein.

Figures 8 to 15 illustrate the patterns of adrenal veins and their variations. The presence and absence of surrounding veins in different specimens and their drainage into the adrenal gland are also illustrated.

The human adrenal gland has two unusual features which apparently play an important but unknown part in its function. The better known of the two is the presence of longitudinal muscle in the walls of the larger veins. Figure 18 shows the arrangement of this muscle and, in particular, its relation to the entrance of smaller veins into the major venous trunks. The second feature is the presence of venous sinuses at the corticomedullary juncture, as shown in Figures 16, 17 and 19. Figure 19 is of particular interest, since it depicts what appears to be a definite connection between the venous sinus and the major venous trunk. The material in the sinus and veins in these figures is the latex injection mass. Figures 12 to 15 also illustrate the presence of these venous sinuses. The venous sinuses should be distinguished and are distinct from small peripheral areas that fill with latex or vinyl acetate because of localized tissue damage or damage to the vessels. The dark mass at the left center of Figure 8 and at the apex of the gland in Figure 9 are examples of these defects. In Figures 12 to 15 centrally placed venous sinuses can be distinguished from the peripherally located areas of filling.

Comment on Technic.—While the technic of injecting vessels of the adrenal glands is simple, the results, unfortunately, vary a great deal. Probably the most important factors are the physiological condition and freshness of the specimen. Under identical procedures glands will differ greatly in the degree of transparency achieved in the clearing agent. This difficulty seems to be related to the thickness of the capsule as well as to the condition of the specimen. Bouin's fixative, with negative pressure, produces firm specimens, with good preservation of histologic detail. Of a variety of clearing agents, methyl salicylate proved best for specimens into which latex had been injected. Other reagents, particularly cedar oil, distorted and softened latex very rapidly. Vinyl acetate, on the other hand, is quickly softened and distorted by methyl salicylate while retaining its shape and firmness in cedar oil.

GENERAL COMMENT

The arrangement of the adrenal venous system in man deserves intensive and continued investigation, for the simple reason that secretions vital to basic bodily functions depend on this unique network for proper distribution to their sites of action. It seems highly important to determine whether the unusual features of this system are performing a needed function, are vestigial or, perhaps, are pathologic. Furthermore, there is a need to correlate various studies on the relation of form to function, which so far have been pursued separately. These studies involve cortical cytologic investigations and stud-

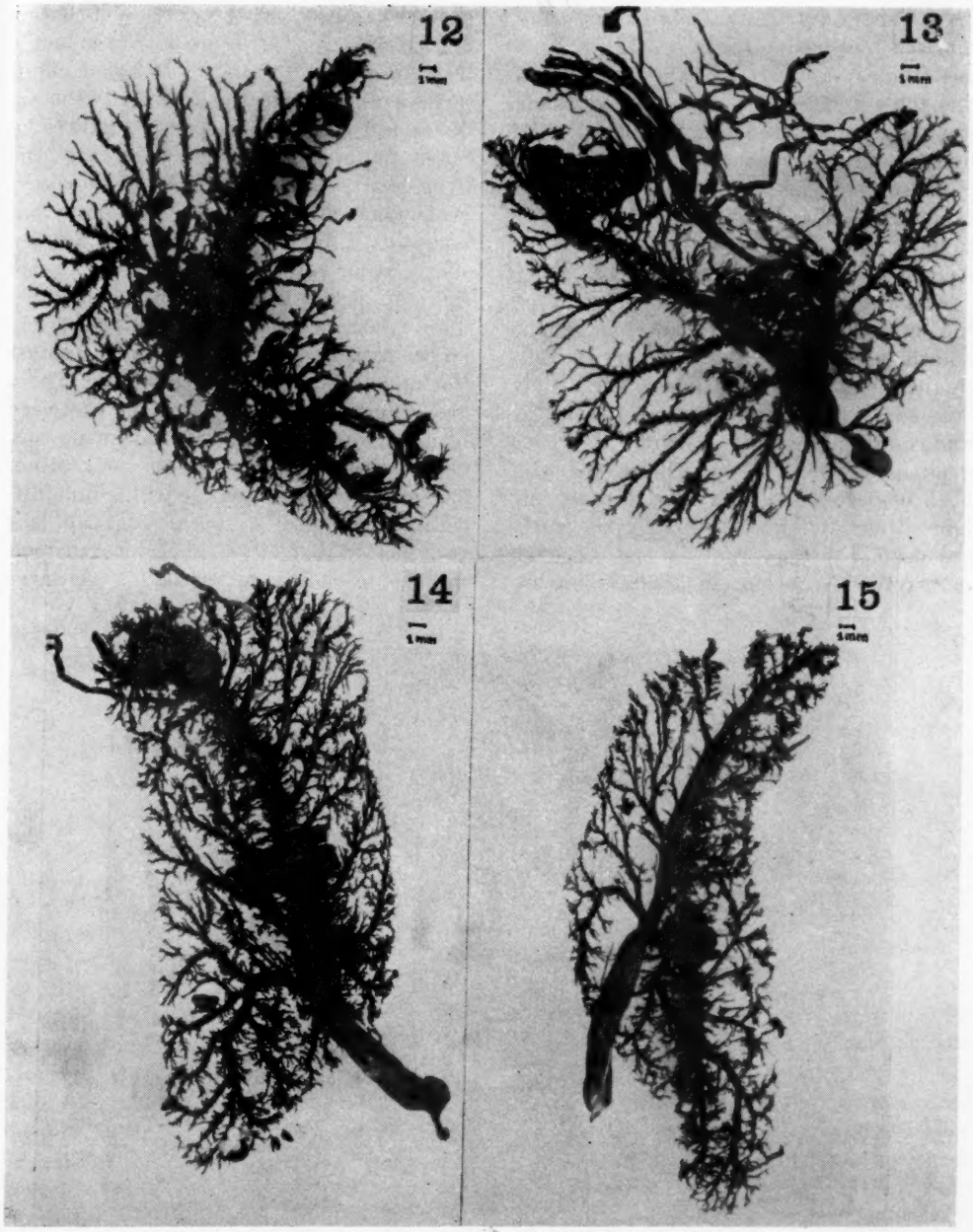

Plate IV.—Vinyl acetate casts of adrenal venous system. Large bodies of vinyl acetate represent adrenal venous sinuses. Fig. 12, right adrenal gland, renal surface. Fig. 13, right adrenal gland, ventral medial surface. Fig. 14, left adrenal gland, renal surface. Fig. 15, left adrenal gland, ventral medial surface.

ies of function which have been ably summarized by Chester Jones' (1957) numerous studies on the role of the fetal cortex and the subject of the present discussion, the function of unusual features of the human adrenal venous system. In none of these fields has any plausible theory of function been advanced, which leads one to hope that closer correlation of the three fields of study may be fruitful.

One area of mutually beneficial research lies in the study of the adrenal venous sinusoids and the corticomedullary sinuses, neither of which has been adequately studied. The sinusoids are in the cortex and comprise the first units of the venous drainage system. These have not only been neglected but have been erroneously labeled as capillaries by numerous workers, despite their recognition and thorough description by Minot in 1900. This investigator described the adrenal cortex as one of the few structures of the adult body in which sinusoids instead of capillaries are the connecting links between arteries and veins. The other structures he noted with this arrangement are the liver, heart, parathyroid glands and coccygeal gland. Minot pointed out that sinusoids differ in several important respects from capillaries, although in each the wall is composed simply of endothelium. Basically a sinusoid is relatively large, with its endothelium fitted against the surrounding parenchymal cells. There are numerous communications between neighboring sinusoids and little or no connective tissue in the sinusoid wall. Minot suspected that sinusoid endothelium differed in important respects from capillary endothelium but lacked the research tools needed to solve the problem. A large

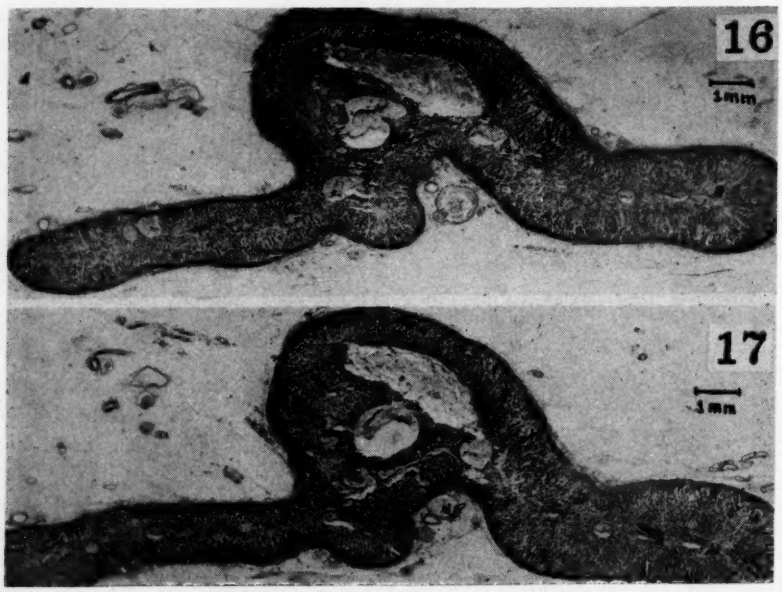

Plate v.—Photomicrographs of adrenal gland injected with latex, cleared and photographed (Fig. 7) and then examined histologically. (Hematoxylin and eosin, 10 microns.) Fig. 16, renal surface at top. Note characteristic shape of cross section. Large corticomedullary sinus and vein. Small veins enter at left. Fig. 17, similar to Figure 16, but shows opening between sinus and vein (Fig. 19).

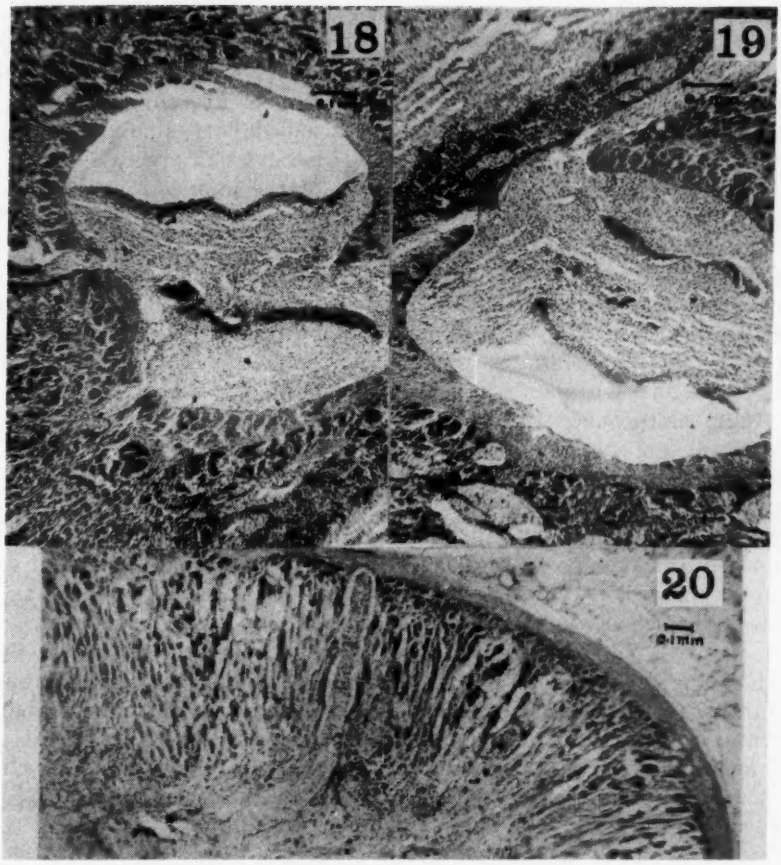

Plate v (*continued*).—Fig. 18, magnified view to illustrate longitudinal muscle of vein and constricted openings of small veins into major vein. Fig. 19, magnified view of opening through longitudinal muscle between adrenal venous sinus and major vein. Fig. 20, large cortical sinusoid that abuts against adrenal capsule.

sinusoid abutting against the capsule may be seen in Figure 20. The latex in the sinusoid has shrunk to some extent.

It is interesting that since the appearance of Minot's work, which seems largely forgotten, the pituitary gland has been found to have sinusoids and indeed bears a striking resemblance to the adrenal gland. Collin (1951) has called attention to the facts that (a) both glands have complicated blood supplies, which seem to be related to function, and (b) both glands have, in effect, a portal system, and each is composed of an endocrine portion and a neurosecretory portion.

The corticomedullary sinuses are often considered artefacts due to fixation or shrinkage. These sinuses are compressed in the usual histologic preparation; only in the injected gland, as seen in Figures 16, 17 and 19, is their true shape and extent approximated. It is our opinion that a direct physiologic relation exists between these sinuses and the musculature of the

adrenal vein. Before considering this relation further, it would be appropriate to discuss briefly this third distinct feature of the human adrenal venous system.

Longitudinal muscle in the adrenal venous wall was first described by Brunn (1873) and has been the subject of numerous studies ever since. It is an arrangement shared by few other animals, according to Bargmann (1933), who examined the adrenals of 26 species of animals from 9 different orders. He tabulated and compared similar studies made by Brunn (1873), Kolmer (1918), Maresch (1921) and Kohno (1925). Taking into account differences of opinion among these workers, it appears that this muscle definitely is present in the gibbon, chimpanzee, orangutan, elephant, hippopotamus, rhinoceros and kangaroo. As Bargmann so aptly phrased it, "No systematic or physiologic homogeneity is recognizable."

Although some investigators, notably Daviolo-Marani (1933), described other arrangements, the disposition of this muscle in the longitudinal plane is generally accepted. The function of the uniquely arranged muscle, however, is still the subject of debate and considerable conjecture. The two major ideas that emerge are based on the belief that epinephrine must reach the sites of action rapidly. One idea is that muscle contraction stops the flow of blood from the vena suprarenalis, causing a flow through other channels and a direct transport to such structures as the liver. The other theory is that muscle contraction results in a quick spurt of pooled adrenal blood through the vena suprarenalis into the general circulation. The evidence in support of either of these ideas is not too strong.

Chester Jones (1957) has postulated that methylation of norepinephrine to epinephrine depends on cortical secretions, pointing out that in species in which the cortical and medullary tissues are separated only norepinephrine is produced. We should like to carry this theory one step further and suggest that in man the corticomedullary sinuses are the site of this methylation process. When the muscles of the adrenal vein are relaxed, the sinuses receive blood from the cortex and medulla, and hormone interaction is possible; when the muscles contract, the channels between sinus and vein open and the blood enters the general circulation. In our opinion, failure of this sequence of events may produce higher levels of circulating norepinephrine and may consequently result in hypertension. Further support for this theory might be adduced from the fact that sinusoids are usually centrally located and neatly sandwiched between the cortical cells and the medullary cells. In Figure 19 an opening through the adrenal venous muscle is visible, and above the muscle at the right a group of medullary cells. The inner border of the cortex is sharply defined, and, although this is not apparent in Figure 19, the juncture of medullary cells with the sinus is a smooth one.

Some pathologic features of the adrenal gland seem definitely related to the presence of the adrenal venous muscle, the cortical sinusoids and the corticomedullary sinuses. These are, in addition to hypertension, adrenal hemorrhage, localized cortical necrosis and venous thrombosis. Hypertrophy of the vein muscle in the presence of hypertension has been studied by many workers. The reader is referred to Heinivaara (1954), who has studied the adrenal morphologic picture in 19 cases of hypertension and reviewed the various related theories. Figure 2 is an interesting supplement to the usual histologic picture of hypertrophied muscle. It illustrates constriction of the veins and adjacent bulging of the venous wall in a case of hypertension. In this case the cause of

death was subarachnoid hemorrhage due to a cerebral aneurysm. In comparison to Figure 1, note the large caliber of the veins and the lack of filling of the fine initial tributaries.

Adrenal hemorrhage occurs but rarely in the pregnant woman (Arnold, Richer and Lepore, 1949) but is an important cause of neonatal death. Molina and Moffioletti (1955) have reported 66 cases of neonatal death and analyzed the circumstances of birth, such as maternal factors, methods of delivery and associated pathologic change. These authors discussed various clinical factors, particularly anoxia, as the cause of this hemorrhage and pointed out the possibility of associated vascular fragility.

The third pathologic feature of the adrenal gland, necrosis and thrombosis, has been studied by Plaut (1955), who examined adrenals from 129 unselected adult male subjects and observed necrosis in 11 instances. In 7 of these cases there was venous thrombosis as well, and in 2 additional cases venous thrombosis occurred in the absence of necrosis. Plaut did not discover any emboli or thrombotic occlusions in the arteries, which seems to implicate the venous system as the site of these pathologic phenomena. He also points out the similarity between the adrenal and pituitary glands, with the added note that pituitary necrosis is notably similar to adrenal necrosis.

Studies are being continued to correlate the vascular structure of adrenal specimens with health and disease in the patient.

SUMMARY

The structure and external veins of 155 fresh adrenal glands were examined and are here described.

Into 105 of these adrenal glands (57 right, 48 left) latex or vinyl acetate was injected to determine the pattern of the intrinsic veins.

The intrinsic venous system is composed of cortical sinusoids and several orders of thin-walled veins that drain into large venous trunks. These vessels, the walls of which contain longitudinal muscle, unite to form the vena suprarenalis.

Another unique feature of the adrenal venous system is the presence of corticomedullary sinuses. These communicate with the major veins through openings in the longitudinal muscle.

The role of this venous system in adrenal function is postulated, and several current theories of normal function and the effect thereon of hypertension, adrenal hemorrhage, necrosis and venous thrombosis are appraised.

Authors' Note: We wish to thank the Directors of Laboratory Services of Jefferson Medical College Hospital, Pennsylvania Hospital and U. S. Naval Hospital, Philadelphia, and Lady of Lourdes Hospital, Camden, New Jersey, for allowing us to examine postmortem specimens.

ZUSAMMENFASSUNG

Es liegt eine Untersuchung und Beschreibung der Struktur und der äusseren Venen von 155 frischen Nebennieren vor. 105 dieser Nebennieren (57 rechte und 48 linke) wurden mit Latex oder Vinylazetat eingespritzt, um das Verlaufsmuster der inneren Venen zu bestimmen.

Das innere Venensystem setzt sich aus Sinusoiden der Nebennierenrinde und aus verschiedenen Gliederungen dünnwandiger Venen zusammen, die in grosse venöse Stämme abfliessen. Diese Gefässe, deren Wände Längsmuskulatur enthalten, vereinigen sich zur Bildung der V. suprarenalis.

Ein weiteres einzigartiges Merkmal des Venensystems der Nebennieren ist das Bestehen kortikomedullärer Sinusgebilde. Diese kommunizieren mit den grösseren Venen durch Öffnungen in den Längsmuskeln.

Es wird die Frage aufgeworfen, welche

Rolle dieses Venensystem in der Funktion der Nebennieren spielt. Verschiedene umlaufende Theorien der normalen Nebennierenfunktion und ihres Einflusses auf den Blutdruck, auf Nebennierenblutungen, Nekrose und Venenthrombose werden abgeschätzt.

RÉSUMÉ

La structure ainsi que les veines externes de 155 surrénales fraîches ont été étudiées et sont ici décrites. Dans 105 de ces glandes (57 droites, 48 gauches), il a été injecté du latex ou de l'acétate de vinyl afin de déterminer la disposition des veines intrinsèques.

Le système veineux intrinsèque est composé de sinusoïdes corticaux de plusieurs types de veines à paroi mince se déversant dans de grands troncs veineux. Ces vaisseaux dont la paroi présente une musculature longitudinale, se réunissent pour constituer la veine surrénale inférieure.

Une autre particularité unique du système veineux surrénal est la présence de sinus corticomédullaires. Ceux-ci communiquent avec les veines majeures par des orifices du muscle longitudinal.

Le rôle de ce système veineux sur la fonction surrénale est mis en évidence, et les auteurs étudient plusieurs théories courantes ayant trait à la fonction surrénale normale et à la manière dont elle est influencée par l'hypertension, l'hémorragie surrénale, la nécrose et la thrombose veineuse.

RIASSUNTO

Sono state esaminate e descritte nella loro struttura le vene esterne di 155 ghiandole surrenali fresche. In 105 di queste ghiandole (57 destre e 48 sinistre) si fece l'iniezione di latex o di acetato di vinile per studiare la rete venosa dell'organo.

Il sistema venoso intrinseco è formato da sinusoidi corticali e da molti ordini di vene a pareti sottili che si scaricano in ampi tronchi venesi. Questi vasi, la cui parete contiene fibre muscolari longitudinali, si riuniscono a formare la vena surrenale.

Un'altra caratteristica del sistema venoso surrenale è la presenza dei seni venosi corticomiollari. Questi comunicano con le vene maggiori mediante aperture nello strato muscolare longitudinale.

Viene spiegato il ruolo del sistema venoso nella ghiandola surrenale, con le varie teorie sulla funzione normale e le manifestazioni patologiche quali ipertensione, l'emorragia surrenalica, la necrosi e la trombosi venosa.

RESUMEN

Se describen en este trabajo la extructura y las venas de 155 glándulas suprarrenales. En 105 de estas glándulas (57 derechas y 48 izquierdas) se ha hecho este estudio inyectando látex o acetato vinílico para determinar la forma de las venas internas.

El sistema venoso intrínseco está formado de sinusoides corticales y varios órdenes de venas de paredes finas que drenan en troncos venosos mas anchos. Estos vasos, cuyas pareces poseen fibras musculares, se unen para formar la vena suprarrenal.

Otra característica única del sistema venoso adrenal es la presencia de senos córtico-medulares. Estos comunican con las venas mayores a través de aberturas en el músculo longitudinal.

Se enuncia el papel de este sistema venoso en la función adrenal y se describen varias teorías corrientes sobre la función normal y su efecto sobre la hipertensión, la hemorragia adrenal, las necrosis y las trombosis venosas.

SUMARIO

Foram examinadas e aqui descritas as estruturas e veias externas de 155 glandulas supra-renais frescas.

Em 105 dessas glandulas (57 direitas, 48 esquerdas), foi injetádo latex ou vinyl-acetato afim de se determinar o trajeto das veias intrinsecas.

O sistema venoso intrinseco é composto de sinusidades corricais e grande quantidade de veias de paredes finas que drenam para ca grandes troncos venosos. Estes vasos, cujas paredes contem musculos longitudinais, se unem para formar a veia supra-renal.

Outro quadro caracteristico do sistema venoso adrenal é a presença de seios cortico-medulares. Estes se comunicam com as veias maiores através de aberturas do musculo longitudinal.

É postulada o papel que exerce o sistema venoso na função adrenal e apreciadas varias teorias correntes de função normal e o efeito sobre a hipertensão, hemorragia supra-renal, necrose e trombóse venosa.

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Experimental Coronary Thrombosis Produced by Introduction of a Stainless Steel Wire

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IT has been shown that introduction of a wire into the dog's aorta produces thrombosis and stenosis, the degree depending on the composition of the wire. Of the wires tested, magnesium and aluminum wire proved most thrombogenic, magnesium and stainless steel wires being less effective.[1] Gage and his collaborators, in 1956,[2] applied this observation to the coronary of the dog, testing magnesium and aluminum wire. This method produced quick effects, with considerable mortality. Trying to find a way to reduce the mortality rate by delaying the thrombogenic effect, we tested stainless steel wire in the coronary of the dog.

Method.—We used 13 mongrel dogs weighing 7 to 9 Kg. Under Kemital and oxygen positive pressure anesthesia, a 20-gauge stainless steel wire was introduced into the anterior aspect of the descending coronary artery. Electrocardiograms were taken before, during and after the procedure. Further tracings were obtained after twenty-four hours, forty-eight hours, eight days and fifteen days until the dog died or was killed.

Fig. 1.—Introduction of wire into canine coronary artery. *C*, coronary artery; *CDA*, descending coronary artery.

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The authors, attempting in a fundamental research investigation to produce canine coronary thrombosis by introducing a stainless steel wire into the anterior aspect of the descending portion of the coronary artery, noted that the mortality rate associated with this procedure was 31 per cent less than with other methods employed for the same purpose. Infarcts were produced in 40 per cent of the dogs that survived the operation.

Stainless steel wire, used in this manner, did not prove particularly thrombogenic; it is not useful in producing experimental coronary thrombosis. Other and more reliable methods are available.

Fig. 2.—Myocardial infarct produced by introduction of stainless steel wire into coronary artery.

Fig. 3.—Coronary thrombosis produced by introduction of stainless steel wire.

Results.—The mortality rate and the causes of death are reported in Tables 1 and 2.

Postmortem Study of Hearts.—In 5 dogs the wire was found in the coronary artery. In 1 it was in the myocardium. In the other 4 dogs it was not found. Three of the 5 dogs with the wire in the coronary artery

presented infarcts, 1 coronary thrombosis and the third a necrotic tissue area near the place occupied by the wire.

Of the 3 dogs with infarcts, electrocardiographic tracings during their lives had revealed subendocardial lesions and ischemia in 2 and massive subendocardial lesion in 1. Thirty days after the operation, the dog with coronary thrombosis showed massive ischemia.

In the 4 dogs in which the wire was not found, 1 had an infarct demonstrated by microscopic section and the other 2 had electrocardiographic signs of subendocardial lesions. In the last one no abnormalities were observed.

Changing Patterns of the Infarcts in Microscopic Sections.—Within forty-eight hours leukocytic infiltration and pyknosis of the muscular bundles occurred. In a week appeared muscular necrosis, with infiltration of polymorphonuclear neutrophils and macrophages, associated with vascular dilatation and some fibers of young connective tissue. In fifteen days there was necrosis, with collapse of connective tissue, fibroblasts and necrotic muscular fibers. Also observed were polymorphonuclears, lymphocytes and macrophages with hematic pigmentation.

Electrocardiographic Tracings During Introduction of the Stainless Steel Wire into the Coronary Artery.—All the dogs showed abnormal electrocardiographic tracings when the wire was introduced. In all cases ventricular extrasystoles occurred, and in some of them ischemia appeared. These patterns were not referable to introduction of the wire; they could be produced by stimulation of the myocardial surface in other locations. Nevertheless, ischemia was more frequent when stimulation was applied over the interventricular groove. There was only 1 instance of ventricular fibrillation, and this was related to ligature of the coronary when the artery was ruptured.

TABLE 1.—*Mortality Rate*

During operation	3
During 1st 24 hr.	0
After 1st 24 hr.	2

TABLE 2.—*Causes of Death*

During Operation	*After 24 Hr.*
1. Heart failure (EKG showed subendocardial ischemia)	1. Massive myocardial infarct (observed at autopsy, in postmortem macroscopic appearance and in EKG; dog died 9 days after introduction of wire)
2. Coronary hemorrhage (EKG showed subendocardial ischemia)	2. Subendocardial lesion (detected by EKG; postmortem and microscopic studies revealed no abnormality)
3. Rupture and ligature of artery during dissection (EKG showed ventricular fibrillation)	

TABLE 3.—*Characteristic of the Four Infarcts Observed**

*Diameter of Infarct***	*Form of Infarct***	*Infarcts Associated with Myocardial Damage (EKG)*	*Infarcts Associated with Fatality*
1 cm., 3; several cm., 1	Irregular, approximating round	4	2 (after 48 hr. and 9 days respectively)

*In 3 of the dogs the wire was found in the coronary artery.

**The location, size and form of the infarcts did not correspond with the cyanotic area observed in most of the dogs when the wire was introduced into the coronary artery. The infarct was always located at a level lower than the area of cyanosis.

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RIASSUNTO

L'autore ha tentato di produrre una trombosi dell'arteria coronarica introducendovi un filo di acciaio inossidabile.

CONCLUSIONI

La mortalità consecutiva alla introduzione di un filo di acciaio inossidabile nell'arteria coronaria discendente anteriore nel cane è più bassa del 31% di quella che si ottiene con qualunque altro metodo. Infarti si producono nel 40% dei cani che sopravvivono all'intervento.

Il filo introdotto nell'arteria coronaria del cane non si dimostra molto adatto a produrre trombosi e pertanto non è particolarmente utile per questa ricerca sperimentale; esistono altri metodi assai migliori di questo.

RESUMEN

En el curso de investgaciones experimentales el autor ha intentado producir trombosis de la arteria coronaria por la introducción de alambres de acero inoxidable en la luz del vaso.

CONCLUSIONES

Cuando se provocan experimentalmente infartos en la arteria coronaria anterior descendente de un perro mediante la introducción de alambre de acero inoxidable la mortalidad es un 31% menor que cuando se empléan otros métodos.

En un cauarenta por ciento de los perros que sobrevivieron a la operación se consiguió producir el infarto.

El alambre de acero inoxidable introducido en la coronaria del perro no se ha mostrado particularmente trombogénico; no es útil para la producción experimental de trombosis coronarias. Existen otros métodos que además son mas dignos de confianza.

SUMARIO

Os AA. tentaram produzir trombose da arteria, como pesquisa fundamental de investigação, por introdução de fio de aço inoxidável na arteria.

CONCLUSÕES

O grau de mortalidade pela introdução de fio de aço inoxidável na arteria coronária descendente do cão, é 31% mais baixa do que a observada com outros métodos produtores de infartes.—Foram provocados infartes em 40% dos cães que sobreviveram à operação.—O fio de aço inoxidável introduzido na coronária do cão, não provou ser particularmente trombogênico; não é útil na produção da trombose coronária experimental. Existem outros métodos e mais práticos.

ZUSAMMENFASSUNG

Die Verfasser berichten über grundlegende experimentelle Untersuchungen, die zum Ziele hatten, eine Thrombose der Kranzschlagader durch Einführung eines nichtrostenden Stahldrahtes in die Arterie hervorzurufen.

SCHLUSSFOLGERUNGEN

Die Sterblichkeitsquote nach Einführung eines nichtrostenden Stahldrahtes in die vordere absteigende Kranzschlagader des Hundes ist 31 Prozent niedriger als die bei anderen Verfahren zur Herstellung eines Infarkts beobachtete.

Es kam zur Bildung von Infarkten bei 40 Prozent der den Eingriff überlebenden Hunde.

In die Kranzschlagader des Hundes eingeführte nichtrostende Stahldrähte erwiesen sich als nicht besonders geeignet zur Schaffung einer experimentellen Koronarthrombose. Es stehen andere und zuverlässigere Verfahren zur Verfügung.

RÉSUMÉ

Au cours d'une étude scientifique les auteurs ont essayé de produire des thromboses de l'artère coronaire par l'introduction, dans l'artère, d'un fil d'acier inoxydable.

CONCLUSIONS

Le taux de mortalité après introduction de fil d'acier inoxydable dans l'artère coronaire antérieure chez le chien, est inférieur de 31% à celui observé par d'autres méthodes aptes à provoquer des infarctus.

Des infarctus ont été notés chez 40% des chiens ayant survécu à l'opération.

Le fil d'acier inoxydable introduit dans la coronaire des chiens ne s'est pas révélé particulièrement favorable à la production de thromboses coronaires expérimentales. Il existe à cet effet d'autres méthodes, plus sûres.

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The Surgeon, by P. T. Quast. (Reproduced by courtesy of the Rijksmuseum, Amsterdam, The Netherlands.)

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Genitourinary Surgery

Percutaneous Needle Puncture in the Management of Polycystic Renal Disease

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The "classic" procedures recommended for the treatment of polycystic kidneys are, in the author's opinion, too traumatic and of little or no help to the patient. He proposes instead the technic of percutaneous needle puncture here described. The procedure is simple, requires only local anesthesia and can be repeated as many times as necessary during the same sitting or later. Furthermore, it has proved, in the author's hands, to be practical and innocuous.

SINCE polycystic renal disease is known to affect both kidneys and to destroy them progressively, the main objective of therapeutic management is to preserve the remainder of the healthy renal parenchyma by simple conservative methods.

During the past fifty years a large number of surgical procedures have been recommended for this purpose, but, so far as my knowledge goes, none of them has been of much help to the patient, if any.

Rovsing, in 1910, advocated cyst puncture exposure of the kidney through the usual lumbar approach. Payr recommended electric needle puncture of the cysts and excision of the cyst walls, with or without renal decapsulation. Goldstein, in 1936, proposed not only cyst puncture but also the bivalving of the kidney, with its marsupialization to the edges of the lumbar incision. Young, in 1946, attempted to provoke retraction of the cysts by aspiration of their contents and subsequent injection of 5 per cent sodium morrhuate solution. Other authors have used 2.5 per cent and 5 per cent carbolic acid solutions.

Although Goldstein's subdermal exposure of the kidney permits newly formed cysts to be aspirated easily, I consider the procedure too traumatic. In addition, it leads to further infection and sclerosis of the kidney. Because of the absorption of the various "sclerosing" substances injected within the cyst in Young's procedure, through the cyst wall into the general circulation and the neighboring renal structures, I am convinced that some of these products may cause general toxic phenomena and/or sclerosis of the ad-

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jacent "healthy" kidney, resulting in more harm than good. Furthermore, all of the aforementioned methods, in order to be properly performed, require the patient to undergo one or more lumbotomies. For these reasons and because the results are inconsistent and usually poor, it is my opinion that none of these methods should be employed in the treatment of polycystic kidneys, particularly if the patient is in an advanced stage of this disease and in poor general condition.

Since 1956, in order to obviate some of the risks and disadvantages of the aforementioned technics, I have been using at the Department of Urology of Madrid Medical School translumbar needle puncture of renal cysts, other than parasitic, in both private and ward patients. This method is simple, practical and, in our hands, has proved to be innocuous. It can be carried out repeatedly in any patient and does not require to be performed in the operating room or with general anesthesia. In several instances we have used this method bilaterally during the same session without any untoward reaction or complication. In some patients the diminution in size of the kidneys and the relief of pain with improvement of renal function, brought about by multiple needle punctures of the cysts and aspiration of their contents, have been remarkable. This improvement was only temporary, however, since polycystic disease progressed steadily by forming new cysts, as a result of which the size of the kidneys increased again and the pain returned, necessitating further needle puncture of the cysts.

Technic.—My set of instruments for puncture and aspiration of renal cysts is quite simple and inexpensive. It consists of (a) two 18-gauge hypodermic needles 12 to 18 cm. long and two or more fine hypodermic needles for infiltration of the local anesthetic agent; (b) two syringes, one holding 50 cc., for aspiration of the cystic fluid and the other 10 cc. for application of the local anesthetic, and (c) several cups, flasks and tubes for the collection and measurement of the withdrawn fluid and its transportation to the laboratory.

The usual preparation of a patient who is to undergo a major operation was not needed, although solid food was withheld for about six hours and a mild sedative was usually administered subcutaneously about one hour prior to the procedure.

Anesthesia.—Local anesthesia, obtained by infiltration of 1 per cent or 2 per cent of procaine or xylocaine solutions, was chosen.

Technic.—With the patient on the operating table in the right or left lateral decubitus position (depending on the side chosen for puncture) and with the corresponding leg extended in a straight line with the body along the table but with the opposite one slightly bent anteriorly, the lumbar region is cleansed and draped with sterile towels in the usual manner. If the kidney can be palpated, the area for puncture in the lumbar region is easily selected; if not, an area just below the edge of the twelfth rib and about 4 to 6 fingerbreadths within the spinal process of the twelfth thoracic vertebra is usually chosen. Through a fine hypodermic needle a wheal is produced by injecting a drop of 2 per cent procaine or xylocaine solution. Through this wheal the anesthetic agent is progressively injected down to the level of the kidney. After withdrawal of the needle, one of the aspiration needles is inserted slowly through the anesthetized tract into the kidney. If the needle has penetrated the renal substance, its outer end moves up and down with the patient's respirations. (Incidentally, the displacement during respiration of the noninfected, polycystic kidney is quite pronounced.) If the needle has entered a cyst, fluid will gush out after withdrawal

of the stylet. With the large syringe connected to the needle, aspiration is then performed each time the tip of the needle is introduced into a different cyst, by probing gently with the syringe in different directions and at different levels, Also, the needle can be reinserted through different paths in order to reach other cysts in different segments of the kidney. Once the entire renal mass has been punctured and aspirated systematically at different levels throughout its surface and thickness, the procedure is completed.

From polycystic kidneys I have been able to aspirate between 100 and 300 cc. of fluid in one session. One of the broad-spectrum antibiotics was usually injected into some of the cysts and along the tracts from which the needle was withdrawn. In some instances I have also injected within the cysts a few milliliters of a solution of testosterone, because of its anabolic and renotrophic effects. Usually only one side was done at a time, but occasionally I have performed bilateral puncture of cysts in one session. A small sterile dressing was applied over the punctured area.

Observations.—The material aspirated from the renal cysts varied from case to case, not only in amount but in macroscopic and microscopic characteristics. Thus, although there were cystic kidneys from which several hundred milliliters of fluid were obtained, in other instances only a few milliliters were withdrawn. The appearance of the aspirated fluid ranged from colorless or straw-colored to completely sanguineous, and also from clear to turbid. Occasionally a thick chocolate-like material was removed. These changes in the macroscopic appearance of the fluid merely indicate the presence of a concomitant infection or of a previous intracystic hemorrhage. The intracystic hydrostatic pressure of the fluid was noted to be high, but it also varied considerably. At present I am conducting manometric studies of this pressure. Thus far my results indicate that it ranges from 15 to 22 mm. of mercury.

Laboratory Studies of the Fluid Withdrawn.—Cryoscopic study at 5 C revealed the formation of many crystals; at 4 C there was evidence of initial solidification; and at 0 C the freezing point was reached. The specific gravity varied between 1.500 and 1.0195. The dry residuum at 100 C amounted to 5.3650 gr. per hundred cubic centimeters (ashes, 0.9223, and organic matter, 4.3827). The water content was 94.6950 gr. per hundred cubic centimeters.

Qualitative Inorganic Composition: The following inorganic substances were present: the cations calcium, sodium, magnesium, potassium, iron and ammonium, and the amions chlorine, polomium and sulfur.

Qualitative Organic Composition: Organically, the fluid contained urea, cholesterine, cystein, cystine, leucine, uric acid, happuric acid, oxalic acid and biliary acids.

Quantitative Studies: The following values, in grams per hundred cubic centimeters of fluid, were obtained: total sulfur, 0.097; inorganic sulfur, 0.0650; organic sulfur, 0.0320; chlorides, 0.2490; nitrogen, 0.6651, and proteins, 4.1569.

COMMENT

The technic of translumbar needle puncture of renal cysts, as it has been described, has presented no difficulties in my experience. This procedure, as has been mentioned, was employed not only for patients with polycystic kidneys but for patients with any type of renal cystic disease other than parasitic cysts or cyst-carcinoma.

Once the diagnosis of renal cystic disease had been established by clinical, laboratory and roentgenographic studies, and particularly if the patient was in a

precarious general condition, the cysts were aspirated by percutaneous needle puncture through the lumbar region.

Although all the cysts I have aspirated were benign, I suggest that whenever a concomitant renal neoplasm is suspected, studies of the cellular component of the fluid should be done by the Papanicolaou technic.

Careful palpation of the kidney(s), with estimation of the actual size and mobility, and a thorough review of the urographic studies were done in every case prior to the puncturing operation.

Mortality and Morbidity.—Up to the time of writing, among 370 percutaneous needle punctures performed for various reasons (renal biopsy, infiltration of the splanchnic plexus, antigrade pyelographic study, etc.) and in some 40 other cases of renal cystic disease, there were no deaths and morbidity was minimal.

In a patient with an obvious renal mass the incidental puncture of any organ other than the kidney is almost impossible. The bowel and the adjacent renal peritoneum are displaced medially by the expanding renal mass, and the great abdominal vessels are protected behind the kidney. In a patient with kidneys that are not enlarged, however, the morbidity associated with this technic may be similar to that reportedly associated with the methods of taking specimens for renal, splenic and hepatic biopsy for "nonsurgical" causes. Within this group we recall the case of an obese woman in whose case a needle biopsy of the kidney was done to rule out periarteritis nodosa as the cause of her complaints, and infiltration of the right splanchnic plexus was attempted. During the introduction of the needle for the splanchnic infiltration, it was noted that gas and fecal material came out through the needle. The procedure was discontinued, but before withdrawal of the needle an antibiotic was injected within the punctured viscus and along the tract. Surprisingly, there were no complications, not even fever, during the postoperative course. With regard to complications following percutaneous needle puncture of renal cysts, there has been only 1 instance of microhematuria, which disappeared spontaneously twenty-four hours after the procedure. Hematomas and/or painful areas in the flank through which the needle puncture was carried out were not observed. There was, in a few instances, some local tenderness, but it was temporary and not worse than the usual discomfort that follows a hypodermic or intramuscular injection. The patients are kept in bed for three or four hours, and as a rule they leave the hospital within twenty-four hours after the operation. Antibiotics, however, were usually given for at least three days.

RÉSUMÉ

Les procédés "classiques" recommandés pour le traitement du rein polykystique sont, de l'avis de l'auteur, trop traumatisants et ne soulagent que peu ou pas du tout le patient. C'est pourquoi l'auteur propose l'adoption de la ponction percutanée ici décrite. La technique en est simple, elle n'exige qu'une anesthésie locale et peut être répétée aussi souvent qu'il est nécessaire durant la même séance ou ultérieurement. Cette méthode s'est révélée pratique et inoffensive entre les mains de l'auteur.

RIASSUNTO

Gli interventi tradizionali in uso nella terapia del rene policistico sono, neil'opinione dell'autore, troppo traumatizzanti e di scarso valore terapeutico. Egli propone, in sostituzione di essi, una tecnica particolare di puntura percutanea. Il metodo è semplice, richiede soltanto l'anestesia locale e può essere ripetuto quante volte sia necessario nella stessa seduta o in tempi

diversi. Si è dimostrato inoltre pratico e innocuo nelle mani dell'ideatore.

ZUSAMMENFASSUNG

Der Verfasser glaubt, dass die "klassischen" zur Behandlung von Zystennieren empfohlenen Verfahren zu traumatisch sind und dem Patienten nur wenig oder garnicht helfen. Er schlägt statt dessen eine hier von ihm beschriebene Technik der perkutanen Punktion der Zysten vor. Das Verfahren ist einfach, lässt sich in Lokalanästhesie ausführen und kann in einer oder mehreren Sitzungen so oft wie nötig wiederholt werden. In der Erfahrung des Verfassers hat sich die Methode als praktisch und unschädlich erwiesen.

RESUMEN

Según el autor los procedimientos clásicos recomendados para el tratamiento de los riñones poliquísticos son demasiado traumáticos y de poca utilidad para el enfermo. En vez de ellos propone el autor y describe en este trabajo una técnica de punción percutánea. Tal método es sencillo, solo requiere anestesia local y puede ser repetido cuantas veces se desee en la misma sesión o posteriormente. Además, en manos de su autor, se ha mostrado el método prático y eficaz.

SUMARIO

Os métodos "clássico" recomendados para o tratamento dos rins policisticos são, na opinião do autor, muito traumáticos e de pequena ou nenhuma ajuda para o paciente.

Propõe porisso a técnica de punctura percutanea equi descrita. O procedimento é simples, requerendo sómente anestesia local, podendo ser repetido as vezes necessárias numa mesma sessão ou posteriormente. Este método provou, nas mãos do autor, ser bastante prático e inócuo.

If we put our ear to the chest of present-day American medicine, we still hear beneath its dazzling white jacket of technological progress the youthful heartbeat of the settler and pioneer, who knows that life is haste and that his problems admit no waiting and therefore theory must sometimes be sacrificed to practice. The spirit that moved the first medical pioneers to risk an ovariotomy without anesthetics in the Kentucky forests, to study gastric physiology experimentally beneath the open skies in the woods of Michilimackinac, to apply anesthetics without controls in operating rooms in Boston, to perform heroic operations in the Middle West because the patient could hardly wait for the benefit of experience and tradition—this spirit determined the two great traits of American medicine.

—*Marti-Ibañez*

Radiobiologic Destruction of the Pituitary Gland: Indications and Clinical Results

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AND
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HYPOPHYSECTOMY is widely used for the endocrinosurgical treatment of relapsed or metastasized carcinoma of the breast, of certain other malignant tumors (certain cases of carcinoma of the prostate, chorionepithelioma, melanosarcoma) and of certain endocrine diseases due to pituitary lesions (eosinophilic adenoma of the pituitary with acromegaly, malignant exophthalmos, Cushing's disease). The results of this therapy have proved satisfactory. For some time now, destruction of the pituitary by means of sealed sources of radioactive material (gold seeds, yttrium pellets), introduced into the pituitary by the nasosphenoid route, has been used more and more frequently in place of surgical hypophysectomy (through the right frontotemporal route according to Olivecrona or the paralateronasotransethmoidosphenoid route according to Chiari). This is a difficult operation and is not always completely effective even if carried out correctly.

From the Surgical Clinic (Prof. A. M. Dogliotti, Director), University of Turin.
Submitted for publication Oct. 22, 1960.

Destruction of the pituitary gland by means of sealed sources of radioactive material has been used more and more frequently in preference to hypophysectomy, since it involves a simpler and less hazardous technic. The authors state the indications for implanting such substances and the results obtained thereby. The clinical results of this nonsurgical form of hypophysectomy are also presented.

Implantation of the pituitary with radioactive sources does not involve such technical difficulties as does surgical hypophysectomy; it can be performed easily and quickly, and it is tolerated by patients in very poor general condition who would not tolerate other operations. Its effect is the subtotal destruction of the pituitary to the same degree and with the same results as those produced by surgical hypophysectomy. *It has been shown, by hormonal and biochemical investigations, that the endocrine disorder caused by destruction of the pituitary, by whatever method, is effective in patients with hormone-sensitive tumors.* Even if the destruction of the gland is incomplete, it is capable of accomplishing *"functional hypophysec-*

tomy." We have proved this by means of biochemical and hormonal investigations carried out systematically before and after destruction of the pituitary.

Indications.—On the strength of our experience, implantation of radioactive isotopes into the pituitary is especially indicated in the presence of the following diseases:

1. Inoperable carcinoma of the breast, either in relapse or with widespread metastasis, in an advanced stage in patients who are not given other treatment or who cannot undergo major surgical operations (such as bilateral ovaro-adrenalectomy) owing to their poor general condition.

2. Eosinophilic adenoma of the pituitary with acromegaly, in the absence of involvement of the optic tract.

3. Malignant exophthalmos.

4. Cushing's disease.

Among the various possible methods we have favored for many years is the one that adapts the nasosphenoid approach under intraoperative radioscopic and roentgenographic control by means of an image intensifier (B. V. 20, Muller).

The radioactive material used consists of pellets of Y^{90}, 5 mm. long and 1.3 mm. thick. Two of these are implanted into pituitary glands of normal or subnormal size (endocrine-surgical treatment of malignant tumors; Fig. 1), while 4 or 5 pellets are required by adenomatous pituitaries (acromegaly due to chromophile adenoma, Cushing's disease, malignant exophthalmos due to pituitary disorders; see Figures 2, 3 and 4). The operation is easy and well tolerated by all patients, and the operative mortality rate is zero. Complications that may arise, though they seldom do, are rhinorrhea, paresis due to lesions of the parasellar nerves and meningitis of the base. Rhinorrhea, due either to perforation of the parasellar meninges or to meningeal reaction caused by too high an implantation of the pellets, is, according to our experience in 4 cases, a slight transient disturbance that requires no particular treatment.

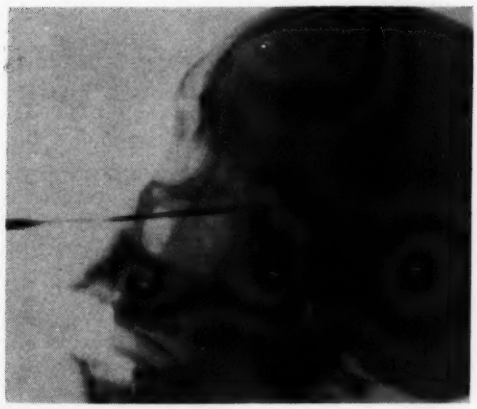

Fig. 1.—Implantation of two pellets of Y^{90} into pituitary gland in a case of mammary carcinoma with metastases.

Fig. 2.—Implantation of three pellets of Y^{90} into pituitary gland in a case of acromegaly.

Lesions of the parasellar nerves due to

Fig. 3.—Lateral roentgenogram of pituitary gland in which four pellets of Y^{90} have been implanted.

Fig. 4.—Implantation of five pellets of Y^{90} in a case of chromophilic adenoma.

too lateral or too anterior implantation of the pellets or to fractures of the parasellar bones caused by the needle, are the complications to be feared most. Three of our patients had paralysis of the oculomotor nerve; 1 has now completely recovered. In a few patients, slight signs of meningeal reaction were observed in the first days after the intervention. Rachicentesis revealed that there was only a simple lymphocytic reaction. Of 2 cases in whom meningitis of the base occurred, 1 died twenty days after the intervention.

The outbreak of polyuria insipida, which in certain cases offers the picture of diabetes insipidus, may be considered a complication arising from the intervention, possibly due to complete destruction of the neurohypophysis with persistence of a certain amount of residual activity in the adenohypophysis. Polyuria, even of the most severe type, disappears completely of its own accord within twenty-three days.

Since 1957, in the Department of Endocrine Surgery in our clinic, the following 88 interventions have been carried out for the radiobiologic destruction of the pituitary with radioactive yttrium:

Carcinoma of the breast	51 cases
Carcinoma of the prostate	2 cases
Eosinophil adenoma of the pituitary with acromegaly	11 cases
Malignant exophthalmos	4 cases
Cushing's disease	2 cases
Carcinoma of the lung	3 cases
Carcinoma of the womb	2 cases
Carcinoma of the sigmoid	1 case
Carcinoma of the tongue	1 case
Chorionepithelioma	3 cases
Reticulosarcoma of the cecum	1 case
Reticulosarcoma of the stomach	1 case
Chondrosarcoma of the mandible	2 cases
Seminoma of the testis	4 cases

Carcinoma of the breast in relapse or with metastasis is the most important of these diseases. Clinical, metabolic and hor-

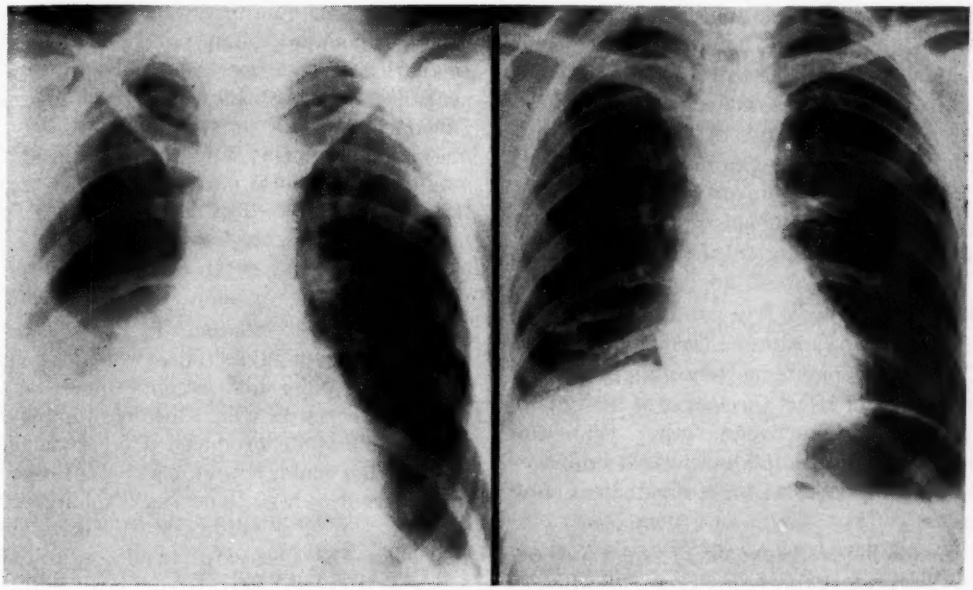

Fig. 5.—Disappearance of pleuropulmonary metastasis (from carcinoma of breast) after radiobiologic hypophysectomy.

monal results have shown the complete efficacy of endocrine-surgical treatment of this disease. Also worthy of note is the group of endocrine disorders (acromegaly due to eosinophilic adenoma of the pituitary, malignant exophthalmos, Cushing's disease) in which radiobiologic destruction of the pituitary gave highly satisfactory results.

At first we tried this type of intervention on a number of malignant epithelial and connective tissue tumors of various organs, with no results; we therefore considered it useless to perform hypophysectomy in other cases of this kind.

Clinical Results of Hypophysectomy.—Carcinoma of the Breast (51 Cases): An immediate improvement in both subjective symptomatology and general condition (decrease or disappearance of bony and pleuro-pulmonary pain, recovery of appetite, increase in weight) was found in about 75 per cent of the patients operated on. Objective remission of the primary or metastatic lesions was found in about 35 per cent of cases within the first month after the intervention. Hypophysectomy is especially effective with regard to pleural metastatic lesions, whose diminution or disappearance occurred in 5 cases (Fig. 5).

The regression of metastases to the mediastinal lymph nodes, which is difficult to observe clinically and roentgenographically, is also fairly frequent. It manifests itself by a pronounced improvement in respiratory capacity as well as by the disappearance of disturbances owing to compression of the mediastinal organs.

In 1 case of metastatic invasion of the anatomic neck of the femur with pathologic fracture of the surgical femoral neck, radiobiologic destruction of the pituitary, together with prolonged treatment including high doses of androgens, brought about restoration of the metastatic areas, with reappearance of the outline of the ana-

tomic femoral neck and healing of the pathologic fracture by means of a bone bridge (Fig. 6). The patient began to walk again. The effects lasted eight months, after which a relapse of the disease rapidly led to the patient's death.

Subjective and objective improvements (decrease in the neoplastic lesions) lasted for periods ranging from three to twenty-six months in about 20 per cent of our patients (10 of 51).

Malignant Tumors of Other Organs (20 Cases): In our experience, hypophysectomy did not affect the course of malignant tumors of any organ, other than the breast; an immediate subjective improvement, however, was obtained in a few cases.

Eosinophilic Adenoma of the Pituitary with Acromegaly (11 Cases): Radiobiologic destruction of the pituitary was done in 11 cases of voluminous eosinophilic adenomas of the pituitary with acromegaly, in a phase of active evolution but without involvement of the optic tract, in which hormonal and roentgen treatments had brought about only slight transient results. In these cases the operation caused disappearance of the subjective symptoms (headache, bone pain, asthenia, polyphagia, polydypsia) and decrease in the volume of the distal parts, the tongue and the face. In the earliest case in which this method was used, the favorable results are still evident thirty-seven months after the intervention.

Malignant Exophthalmos (4 Cases): Radiobiologic hypophysectomy was done in 4 cases of malignant exophthalmos with hyperthyreosis, in which medicoradiologic therapy had not produced any improvement in the ocular symptoms. The purpose of intervention was to decrease the hypersecretion of the pituitary thyrotrophic hormone. The successful results achieved in these 4 cases justify the choice of this procedure in cases of inoperable thyrotoxic malignant exophthalmos, as it is well tolerated even by an extremely delicate patient.

Cushing's Disease (2 Cases): Radiobiologic destruction of the pituitary gave

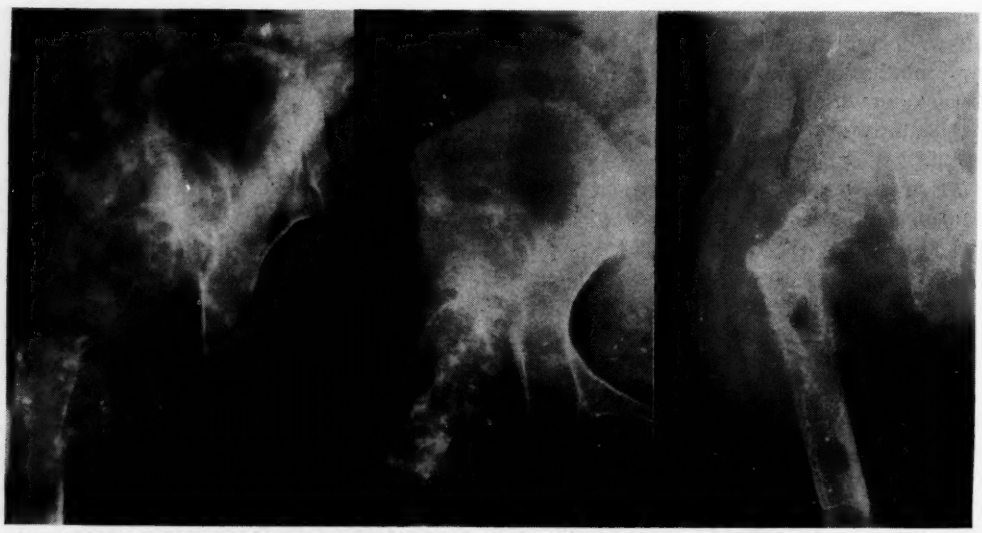

Fig. 6.—Restoration of metastatic focal area, reappearance of outline of anatomic femoral neck and healing of pathologic fracture after radiobiologic hypophysectomy.

satisfactory results in 2 patients who presented a picture of severe nontumoral hypercorticoadrenalism. The first patient had never been treated before; the second suffered a relapse after bilateral subtotal adrenalectomy. The hypercorticoadrenal symptoms improved progressively after implantation of Y^{90} into the pituitary; in the second case another implantation of Y^{90} was required five months after the first, in order to bring about full recovery.

In the treatment of the two diseases last mentioned (malignant exophthalmos and Cushing's disease) implantation of radioactive substances into the pituitary has, in our opinion, two advantages over surgical hypophysectomy, First, a regression of the endocrine picture may be achieved without causing any serious functional deficiency of the other glands that depend upon the hypophysis; secondly, if the result thus obtained is inadequate, further implantations may be carried out without technical difficulties or major risks.

ZUSAMMENFASSUNG

An Stelle der Resektion der Hypophyse wird mehr und mehr die Zerstörung der Drüse mittels Kapseln mit radioaktiven Substanzen bevorzugt, weil die Technik dieses Verfahrens einfacher und weniger gefährlich ist. Die Verfasser geben die Indikationen zur Einpflanzung des radioaktiven Materials und die damit erzielten Erfolge an. Sie stellen ferner die klinischen Ergebnisse dieser nicht-chirurgischen Form der Hypophysenausschaltung dar.

RÉSUMÉ

La destruction de la glande pituitaire ou moyen de tubes scellés de substances radioactives a été employée de plus en plus fréquemment de péférence à l'hypophysectomie, du fait que la technique en est plus simple et moins dangereuse. Les auteurs précisent les indications de l'implantation de ces substances et les résultats obtenus. Ils présentent aussi les résultats cliniques de cette forme nonchirurgicale d'hypophysectomie.

RESUMEN

La destrucción radioactiva de la pituitaria mediante cápsulas selladas se ha venido empleando con mayor frecuencia que la hipofisectomía ya que la técnica es mas facil y con menos riesgo. Los autores enumeran las indicaciones para la implantación de estas sustancias radioactivas y los resultados obtenidos.

SUMARIO

A destruição da glandula pituitária por fontes seladas de material radioátivos, tem sido usado com uma frequencia cada vez maior, pois, trata-se de técnica mais simples e menos perigosa. Os AA. apresentam as indicações para implante destas substancias e os resultados obtidos. Apresentam também os resultados clinicos desta hipofisectomia não cirurgica.

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Fracture-Dislocation of the Spine with Paraplegia

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LILONGWE, NYASALAND

IN cases of spinal fracture with paraplegia the prospects of obtaining a good functional result often seem unfavorable, especially when there is retention of urine and feces and when the roentgen appearance suggests that the spinal cord has been completely crushed. In these circumstances, however, the likelihood of success is improved if three measures are adopted early:

1. Reduction of the displacement by manipulation or, if this is impossible, by operative means.
2. Maintenance of the corrected position by the application of two plaster shells, one to the posterior and one to the anterior aspect of the patient's body.
3. The performance of suprapubic cystostomy.

The following case is reported with a view to illustrating the usefulness of these three measures.

REPORT OF CASE

J. F., an African aged about 30, was admitted to Lilongwe African Hospital on April 30, 1960, having fallen from a tree four and one-half hours earlier, while cutting firewood for curing tobacco. He complained of severe pain in the back and legs. Pronounced bruising of the left temple, tenderness over the cervical portion of the spine, pain and swelling over the lumbar portion of the spine and partial paraplegia were noted. The patient could move his toes a little and could feel pinching of the feet but could not move his legs or bend his knees. Roentgenograms showed a fracture of the left parietal bone and a fracture-dislocation between the twelfth thoracic and the first lumbar vertebra, apparently with complete obliteration of the vertebral canal (Fig. 1).

Fig. 1.—Roentgenogram taken on admission, April 30, 1960.

On the day of admission, with local anes-

From the Lilongwe, African Hospital, Lilongwe.
Submitted for publication Dec. 1, 1960.

A case is described of fracture dislocation of the thoracolumbar portion of the spine, with almost complete paraplegia. A satisfactory result was obtained by early open reduction of the displacement, application of dorsal and ventral plaster of paris shells and suprapubic cystostomy.

Fig. 2.—Roentgenogram taken after manipulation, May 2, 1960.

thesia the spine was manipulated and put up in plaster in hyperextension. Imperfect reduction was obtained (Fig. 2).

On the following day, as the patient had not passed urine since the accident, a suprapubic cystostomy was performed, also with local anesthesia.

On May 3 it was decided that the failure to obtain complete reduction of the dislocation by manipulation was due to locking of the articular facets. An open operation was therefore performed, with the region under local anesthesia. When the spinous processes and laminae were exposed by a median vertical incision, the articular facets between the twelfth thoracic and first lumbar vertebrae were observed to be locked. They could not be "unlocked" without danger of stretching the spinal cord. The facets of the first lumbar vertebra were therefore removed, the spinous processes of the two vertebrae grasped with bone-holding forceps and the vertebrae manipulated into their normal positions. The spinous processes were secured with stainless steel wire, and the wound was closed. A dorsal plaster bed was applied.

A roentgenogram (Fig. 3) showed that almost perfect position had been obtained.

Splints were constructed to keep the feet at right angles to the legs. A ventral plaster bed was made so that the patient could be turned over every twelve hours. Rectal washouts were administered daily, as there was retention of feces. Circumcision was performed to prevent suppuration under the prepuce.

By July 1, as the patient had regained his capacity to move his legs, the plaster bed was replaced by a jacket, but this was unsatisfactory—the patient was still unable to walk. The jacket was therefore removed and the patient laid on a Stryker frame, which was turned round every twelve hours, so that he could spend half his time prone and half supine as before.

Two weeks later, he began to micturate via the urethra, and the suprapubic tube was removed; but he could not regulate micturition, though attempts were made to get him

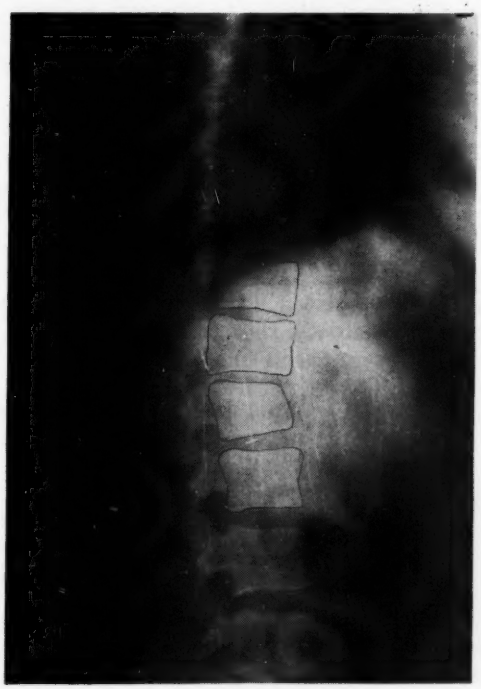

Fig. 3.—Roentgenogram taken after facetectomy, May 3, 1960.

SURGERY, GYNECOLOGY & OBSTETRICS

to control the act by the use of an alarm clock.

Further roentgenograms were taken on July 27 and again a month later. These showed that the corrected position of the vertebrae was being maintained and that good bony union was established between the vertebral bodies.

On September 4 the patient started to walk. He can now walk well. He does not have normal control over micturition, but he passes urine before getting up to walk and is able to tell when it is necessary for him to micturate again. The bowels are controlled by enemas every other day. He has been taught to give the enemas himself.

When this patient was brought to the hospital his condition seemed almost hopeless. Now, except for imperfect control of the sphincters, he is perfectly healthy and cheerful and is entirely free from bedsores. He was discharged on September 14.

ZUSAMMENFASSUNG

Es wird ein Fall von Bruchdislokation des thorakolumbalen Abschnittes der Wirbelsäule mit fast vollständiger Querschnittslähmung beschrieben. Frühzeitige chirurgische Einrichtung der Verlagerung, Anlegung von Gipsschalen am Rücken und am Bauch und eine suprapubische Blasenfistel führten zu einem befriedigenden Heilungserfolg.

RÉSUMÉ

L'auteur décrit un cas de fracture avec dislocation de la colonne thoracolombaire, avec paraplégie presque totale. Il a obtenu un résultat satisfaisant grâce à une réduction sanglante précoce, avec plâtre de Paris dorsal et ventral, et cystostomie sus-pubienne.

RIASSUNTO

Viene descritto un caso di frattura lussazione del tratto toracolombare della colonna, con paraplegia quasi completa. Si ottenne un risultato soddisfacente mediante la riduzione cruenta precoce della lussazione, l'applicazione di un busto gessato e una cistostomia sovrapubica.

RESUMEN

Se describe un caso de fractura luxación de la columna toracolumbar con paraplegia casi completa. Se pudo obtener un resultado excelente por reducción cruenta precoz, aplicación de entesado con moldes dorsal y ventral y cistostomía suprapúbica.

SUMARIO

O A. descreve um caso de deslocamento com fratura da porção tóracolombar da coluna com paraplegia quase completa. Obteve um resultado satisfatório pela redução aberta precoce do deslocamento, aplicação dorsal e ventral de gêsso e cistostomia suprapúbica.

"Philosophy" means "love of wisdom," and philosophy in this sense is what men must acquire if the new powers invented by technicians, and handed over by them to be wielded by ordinary men and women, are not to plunge mankind into an appalling cataclysm.

—*Russell*

Tuberculoma of the Brain

Pathologic Picture and Diagnosis

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AND
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The authors analyze a series of tuberculomas of the brain, pointing out that these tumors, although almost eliminated in the more advanced Western nations, still present an important problem to the neurosurgeon in other parts of the world. The incidence, pathologic picture and diagnosis are discussed, as are the different types of tuberculoma and their effect upon the surrounding brain. In the authors' opinion, surgical intervention is contraindicated except when intracranial hypertension is so severe as to make it unavoidable.

THE diagnosis of tuberculoma is important, for this tumor is amenable to modern treatment. Before the advent of streptomycin an attempt to remove a tuberculoma was rarely successful, as the operation was often followed by tubercular meningitis (Obrador[1]). With the use of antibiotics, streptomycin, isonicotinic acid hydrazide and para-aminosalicylic acid it is now possible to remove a tuberculoma of the brain with great success.

Frequency.—Tuberculoma of the brain is common in India, and also in South America, Eastern Europe, Southern Russia and various Asian countries. In the earlier part of this century it was common in the West. Starr[2] reported that tuberculomas constituted approximately one-third of all intracranial tumors. In 1925, Critchley[3] reported that among children tuberculomas were most common, gliomas being second in frequency. Since then, however, with the improved standard of living of the common man and the establishment of public health measures, tuberculomas have almost completely disappeared from the more advanced western countries.

They still present a formidable problem, nevertheless, to neurosurgeons in the other nations. In India, Reddy[4] reported that tuberculomas accounted for 10.5 per cent of all tumors of the brain recorded by the pathology department of the Madras Medical College and for 14.5 per cent of those on record at the Andhra Medical College in 1950. One of us (B. R.)[5] reported an incidence of 19.4 per cent. In South America, in 1901, Asenjo[6] reported an incidence of 15.9 per cent and Obrador of Spain an incidence of 10 per cent.

In the present series of 880 suspected intracranial tumors in cases observed from 1950 to 1959, tuberculomas formed one-fifth of the series. It is assumed that the problem of tuberculoma in India will continue until the standard of living goes up and successful public health measures can be established.

From October 1950 to October 1959,

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tuberculoma of the brain has been treated in 175 cases. The diagnosis was presumptive, based on the evidence of the concomitant existence of tuberculosis elsewhere in the body, a previous history of the disease or a history of contact. The practice has been established of inquiring into the family and personal history of every patient suspected of having an intracranial tumor for evidence of tuberculous disease. Every patient is also investigated for evidence of tuberculous lesions elsewhere in the body.

An analysis of such an inquiry is presented in Table 1.

TABLE 1.—*Diagnostic Data Suggesting Tuberculosis of the Brain*

History	
Contact with open pulmonary tuberculosis	11
Previous history of pulmonary tuberculosis	11
Pleurisy with effusion	2
Pleurisy with tuberculous abdomen	1
Tuberculous meningitis	1
Tuberculous endometritis	1
Tuberculous nephritis	1
Pott's disease of the spine	2
Tuberculosis of joints	3
Present Evidence	
Irregular low fever	23
Active lesion of lungs	14
Cervical lymphadenitis	10
Mediastinal glands	20
Endometritis (with amenorrhea)	3
Tenosynovitis	1
Increased sedimentation rate	70

TABLE 2.—*Age Incidence of Tuberculoma of the Brain*

Age	*No. of Patients*
0-10	62
11-20	49
21-30	48
31-40	14
41-50	2

In more than 80 per cent of cases, therefore, there was some indication of the possibility of a tuberculous infection.

Tuberculomas are more common in children than in the adults. Table 2 indicates the age incidence.

The sex distribution was almost equal; i.e., there were 86 male and 89 female patients.

The site of occurrence of lesions is shown in table 3.

The diagnosis and location were based on a thorough clinical neurologic examination, plain radiography, roentgenographic studies, electroencephalogram and contrast roentgen investigations such as angiographic studies and the taking of ventriculograms with air and myodil.

Pathologic Picture.—With experience in the management of tuberculomas of the brain, we have been able to gain some information as to the pathologic character and the life history of the tuberculoma. A tuberculoma of the brain is secondary to

TABLE 3.—*Site of Occurrence of Tuberculoma of the Brain*

Site	*Number*	
	Right	*Left*
Cerebrum		
Frontal	9	4
Motor	14	21
Parietal	7	9
Occipital	1	2
Temporal	3	12
Basal ganglion	1	—
Posterior fossa		
Cerebello pontine angle	9	11
Cerebellum	9	
Midline (basal)	20	
Vermis	15	
Brain stem	1	
Midbrain	1	
Pons	1	
Multiple	4	
Base of brain	1	
Not determined	14	

a primary source of infection elsewhere in the body. The portal of entry of the tubercle bacillus is usually the tonsil, the mediastinal glands, the intestines or the lungs. When tuberculous bacteremia is present, if conditions are favorable, the bacteria may lodge themselves in the brain either on the surface near the subarachnoid space, near the ventricle or deeper in the brain substance. If the resistance of the patient is poor, the tubercle bacilli from the subarachnoid focus burst into the subarachnoid space and cause diffuse tubercular meningitis. Large tuberculomas following tuberculous meningitis were not observed in our series. Small or microscopic tuberculomas are frequently present in patients with tuberculous meningitis.

In patients with greater resistance the bacilli become localized and do not burst into the subarachnoid space. Instead they may continue to form a granuloma and begin to become enlarged. In the first stage there is a single nodule, or a group of multiple follicles that coalesce and form a small tuberculoma. Giant cells are frequently observed in tuberculomas, though endothelial cell proliferation dominates the picture (Fig. 1). The defense forces of the brain are mobilized. The reticuloendothelial cells from the perivascular spaces form the chief elements of the inflammation that localizes the infection. The process is usually avascular. In the presence of tuberculosis, necrosis is accompanied by coagulation of the cell bodies, not softening and liquefaction as in the formation of an abscess. As the disease progresses, the size of the granuloma gradually increases. Because of the absence of any fascial septums in the brain, the mass has no resistance to encounter and therefore gradually increases to form a tumor mass (Boyd[7b]). As the size increases the central portion is deprived of its blood supply, and caseation sets in. Of the 175 tuberculomas in the series, only

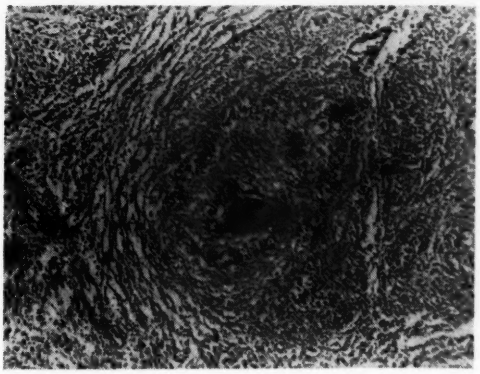

Fig. 1.—Photomicrograph showing center of tuberculoma with giant cell formation and endotheloid reaction.

2 showed liquefaction of a small area in the center. The affected area remains solid and becomes transformed into a granular mass. From the surface of the tuberculoma a few follicles may be lodged in the surrounding brain (Fig. 2); thus the surface of the tuberculoma is lobulated.

A tuberculoma may reach a large size; the largest one recorded occupied almost half of one hemisphere. Tuberculomas are usually multiple. This has been discovered by postmortem examination of the brain; but clinically, it is only one or two large masses that give rise to neurologic symptoms. Surgically, only the largest masses require removal. Hence, in this study, which deals with the incidence of multiple tuberculoma in cases under treatment, the percentage (6 per cent), clinically and roentgenographically, was small.

The Diffuse Tuberculoma. — Tuberculomas do not always form discrete masses. Our experience reveals that they fall into two types. First and more numerous are large discrete tuberculomatous masses (Fig. 2). These usually occur in the subcortical area or the deeper regions of the brain. They often cause increased intracranial pressure. The less frequent type appears different from both the pathologic and the clinical point of view; the tuber-

culous lesion is diffuse and infiltrating, and it occurs in the cortex and the subcortical regions of the cerebrum (Fig. 3) or the cerebellum. The pathologic process is more vascular than in the major group of discrete tuberculomas. This vascularity can be clearly seen angiographically, as well as during operation in those cases in which therapy is required. The cortex appears red and hyperemic. The capillaries are congested. On palpation, the cortex is harder than normal.

Occasionally this infiltrating type of tuberculoma also forms deeper tuberculomatous nodules. In these circumstances the intracranial pressure rises and surgical intervention becomes necessary. In the few cases of this series in which operation was performed there was no definite line of demarcation between the diseased and the normal cortex. The inflammatory cells spread diffusely among the neural and glial elements of the cortex. There may be an occasional giant cell, but round cell infiltration predominates. Sometimes these infiltrating tuberculomas involve the inner layer of the cranial dura mater and produce profound thickening therein. This thickening is confined to the inner layer; the outer layer shows only hyperemia and forms an effective barrier against the spread of the tuberculous process. Such meningeal involvement is rare in cases of discrete tuberculoma. When the tuberculomatous process involves the outer layer of the cortex and the inner layer of the dura, it has been referred to as tuberculoma *en plaque* (Boyd[7]).

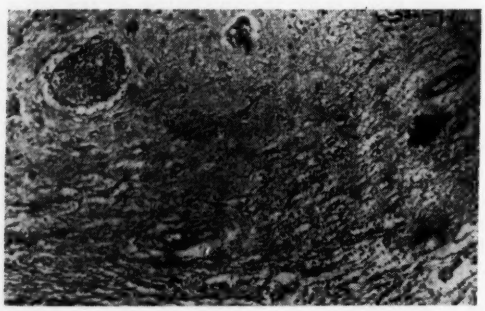

Fig. 2.—Photomicrograph showing periphery of infiltrating type of tuberculoma. Inflammatory cells spread diffusely through brain tissue. Separate tuberculous nodule is forming at left upper corner of specimen.

Clinically, and roentgenographically also, these groups differ. This has been discussed elsewhere (Ramamurthi and Varadarajan[5e]). The clinical picture of the infiltrating tuberculoma is as follows: The patient presents with a progressive neurologic disability, with evidence of concomitant tuberculous infection in the body. The intracranial pressure is usually not raised. The results of the Mantoux test are positive. With antituberculous treatment, the neurologic signs clear and the tuberculous focus shows improvement. Operation is not indicated in such cases, as the condition improves with antibiotic therapy. If surgical excision is done, it will involve removal of part of the functioning brain and may result in a permanent neurologic deficit. Surgical intervention is indicated only when the increase in intracranial pressure is severe. This happens when the diffuse process spreads into the deeper portion of the brain and begins to form masses that have a space-taking effect. Tuberculomas may occur also in a thickened arachnoid; this is probably the point of origin for tumors of the cerebellopontine angle. The arachnoid becomes thickened, and the tuberculoma increases in size. Later it may compress the cerebellum and occasionally infiltrate it.

Calcification in a Tuberculoma.—Microscopic calcification inside a tuberculoma is common. Removed tuberculomas, when studied roentgenographically, show mild, diffuse calcification. Roentgen evidence of calcification in plain roentgenograms of the skull is not as common as is supposed. In our series, such calcification was observed in only 6 cases. The massive calci-

fication noted in some cases of tuberculoma is located more in the surrounding liquefied brain than inside the tuberculoma. During the progress of inflammation tuberculous endarteritis occurs, leading to thrombosis and loss of blood supply. This may lead occasionally to necrosis of some area of the brain surrounding the tuberculoma. This area often becomes calcified, after liquefying, and this calcification is very dense and well evident in the plain roentgenograms.

Effect on the Surrounding Brain.—As it progresses the tuberculoma compresses the surrounding brain. The glial elements, so compressed, may sometimes appear to form a pseudocapsule. There is some edema in the surrounding brain (Fig. 3), though not as pronounced as in a case of glioblastoma. This edema is partly inflammatory and partly due to compression of draining venules.

Reasons for Improvement with Antituberculous Treatment.—Tuberculomas show definite recession with antibiotic treatment. When recession occurs, the inflammatory reaction gradually subsides and the mass becomes smaller. With antituberculous treatment, enlarged glands in the neck may be seen diminishing and almost completely disappearing. The same process occurs with small tuberculomas of the brain.

With the reduction in size the pressure on the surrounding brain becomes less and the inflammatory and pressure edema clears. All these lead to an improvement in the neurologic condition. This has occurred in more than 50 per cent of cases.

Another factor also is responsible for improvement. When small tuberculomas occur near the cerebrospinal fluid pathways, they obstruct circulation and cause internal hydrocephalus; thus, such tuberculomas may cause increased intracranial tension of a severity grossly disproportionate to their size. This is common with

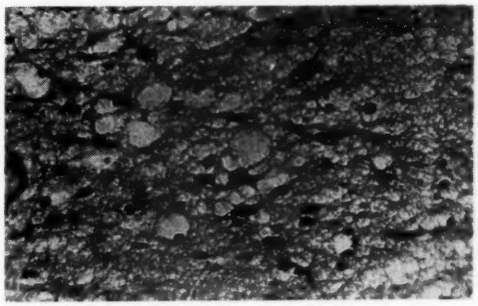

Fig. 3.—Photomicrograph showing edematous brain tissue surrounding tuberculoma. Reduction in this edema leads to clinical improvement.

tuberculomas of the posterior fossa. In such cases, if the intracranial tension is reduced by tapping the lateral ventricles and giving antibiotic treatment, there is remarkable improvement. In a few days the size of the tuberculoma goes down, the obstruction clears and major surgical measures become unnecessary.

From a review of the pathologic aspects of tuberculomas of brain, it can be seen that the line of treatment to be adopted varies with the case. Vigorous antibiotic therapy with streptomycin and isonicotinic acid hydrazide is the chief basic requirement. Operation is indicated to relieve intracranial tension. This may take the form of creating posterior burr holes to tap the ventricles, or it may mean a direct surgical approach for removal of the tuberculous masses, depending on the nature of the tuberculoma and its site.

SUMMARY

Tuberculomas of the brain are common in certain parts of the world. The clinical diagnosis is presumptive and is based on contact history or on evidence of the concomitant existence of tuberculosis elsewhere in the body. The pathologic aspects of tuberculosis are discussed. In the authors' opinion, tuberculomas form in patients who have greater resistance than those who have tuberculous meningitis.

In addition to the usual large subcortical tuberculoma, a variety is described that infiltrates the cortex diffusely and causes focal neurologic signs without raising the intracranial tension except in the late stages.

Roentgen calcification in a tuberculoma was encountered in only 6 per cent of the cases, though microscopic evidence of calcification was present in a large number.

The reasons for improvement brought about with antituberculous drugs are presented.

Authors' Note: Our thanks are due to the Dean of the General Hospital, Madras, for permission to publish this article.

ZUSAMMENFASSUNG

Tuberkulöse Granulome des Hirns kommen in gewissen Teilen der Welt häufig vor. Die klinische Diagnose ist mutmasslich und stützt sich auf die Anamnese von Kontakt mit tuberkulösen Kranken oder auf den Nachweis des gleichzeitigen Bestehens von Tuberkulose in anderen Körperorganen. Die pathologischen Eigenheiten der Tuberkulose werden erörtert. Die Verfasser glauben, dass Tuberkulome bei solchen Patienten entstehen, die eine grössere Resistenz aufweisen als Kranke mit tuberkulöser Rückenmarkhautentzündung.

Ausser dem gewöhnlichen grossen subkortikal gelegenen Tuberkulom wird eine andere Form der Erkrankung beschrieben, bei der der Prozess die Hirnrinde diffus infiltriert und neurologische Herdsymptome hervorruft, ohne den Hirndruck, es sei denn im späten Stadium der Erkrankung, zu erhöhen.

Röntgenologisch wurden Verkalkungen in einem Tuberkulom nur in sechs Prozent der Fälle beobachtet, obgleich mikroskopisch Verkalkungen in einer grossen Anzahl der Fälle vorhanden war.

Die Gründe der durch antituberkulöse Medikamente erzielten Besserungen werden dargestellt.

RÉSUMÉ

Les tuberculomes cérébraux sont courants dans certaines parties du monde. Le diagnostic clinique présomptif est basé sur une anamnèse directe ou sur la présence d'une tuberculose concomitante dans un autre organe. Les aspects pathologiques de la tuberculose sont discutés. Les auteurs pensent que les tuberculomes se développent chez des malades plus résistants que ceux atteints d'une méningite spinale.

En plus du gros tuberculome sous-cortical habituel, l'auteur décrit une variété de tuberculome infiltrant le cortex de façon diffuse et provoquant des signes neurologiques focaux sans augmenter la pression intracranienne, sauf à des stades avancés de la tumeur.

Dans 6% des cas seulement les examens radiologiques ont montré une calcification dans le tuberculome, alors que l'examen microscopique a révélé des calcifications dans un grand nombre de cas.

L'auteur cite les raisons des améliorations obtenues au moyen de médicaments antituberculeux.

RIASSUNTO

I tubercolomi del cervello sono frequenti in certe parti del mondo. La diagnosi clinica è soltanto presuntiva, e si basa sulla anamnesi e sulla presenza di altre lesioni tubercolari nell'organismo. Dopo avere trattato gli aspetti anatomopatologici della lesione, l'autore esprime l'opinione che i tubercolomi si formano nei malati che hanno una maggior resistenza.

Oltre alle forme comuni di tubercoloma sottocorticale, ne esistono altre che infiltrano diffusamente la corteccia e causano segni focali senza aumentare la pressione endocranica tranne che nelle fasi avanzate.

Calcificazioni radiologicamente evidenti

si incontrano solo nel 6% dei casi, ma allesame istologico la calcificazione è presente molto più spesso.

La terapia specifica ha migliorato notevolmente i risultati.

RESUMEN

Los tuberculomas del cerebro son frecuentes en algunas partes del mundo. Debe pensarse en este diagnóstico clínico a la vista de la historia o ante la evidencia de lesiones tuberculosas concomitantes en cualquiera otra parte del cuerpo. Se exponen los aspectos patológicos de la tuberculosis. Opina el autor que los tuberculomas se forman en pacientes con una mayor resistencia que aquellos con meningitis espinales.

Como adición al común tuberculoma extenso subcortical se describe una variedad que infiltra difusamente la cortezay causa signos neurológicos focales sin aumento de la tensión intracraneal salvo en las fases tardías.

Solo en un 6% de los casos se encontraron calcificaciones por la radiografia aunque histologicamente pudo demostrarse en mayor número de casos.

Se exponen las razones de las mejorías obtenidas con las drogas antituberculosas.

SUMARIO

Tuberculomas do cérebro são comuns em certas partes do mundo. O diagnóstico clínico é presuntivo e se baseia em historia de contacto, ou em evidência de tuberculose concomitante em outras partes do corpo. Discutem os aspectos patológicos da tuberculose. Na opinião dos AA. os tuberculomas se formam em pacientes que tem maior resistencia do que naqueles com meningite espinhal. Em adição ao grande tuberculoma subcortical.

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Vanity is so anchored in the heart of man that soldiers, bricklayers, porters are given to boasting, and desire admiration. Philosophers even are in the same case. And those who write against this passion aspire to the glory of having written well, while their readers look to derive glory from their reading. Nay, I who am writing this am, perhaps, moved by the same desire, and possibly my readers will be affected in a like manner.

—*Pascal*

Ophthalmologic Surgery

Congenital Glaucoma

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IT IS most gratifying to note that congenital glaucoma occurs with less frequency than does glaucoma acquired in adulthood. Only in comparatively recent years have ophthalmologists come to a fairly satisfactory knowledge of the diagnosis, symptoms, clinical course and treatment of this lesion. It is unfortunate that the patients, as a rule, are not seen early enough by the ophthalmologist and consequently treatment is often delayed. It is of vital importance that early diagnosis be made and treatment begun early if the optimal results are to be secured.

The general practitioner and the pediatrician see the patient first; therefore, the responsibility of recognizing the existence of some type of ophthalmic disorder falls upon them. I do not imply that they should be expected to make a correct diagnosis of the disease, but they should be alert to the fact that the patient has an ocular disorder and should be seen by a specialist as early as possible.

Submitted for publication Dec. 30, 1960.

The author summarizes the problem of congenital glaucoma, with emphasis on the importance of early detection and diagnosis of the lesion. He urges general practitioners and pediatricians, who are often the first to be consulted, to be alert to the possibility of glaucoma and refer the patient to a specialist at the earliest possible moment, since the quality of the ultimate result of treatment is at stake.

The diagnosis, in some cases, is so difficult as to be almost impossible. In those cases, however, which present the classic symptoms—photophobia, epiphora and blepharospasm, either constant or intermittent—the diagnosis should be quite simple. When the condition is advanced there is high intraocular tension, usually associated with a large, hazy cornea, a deep anterior chamber and rupture of Descemet's membrane. Nevertheless, I have observed cases in which the cornea had a diameter of 13 to 14 mm., a deep anterior chamber and a cornea remaining quite clear. A decided handicap to the recording of intraocular tension in a young child under general anesthesia is that often, owing to the effect of the anesthetic, the aqueous flow is inhibited and normal tension will be recorded. On the other hand, light anesthesia in a child with a normal eye may result in an increase of intraocular tension, owing to the resistance exerted by the patient, the squeezing of the eyelids and the forcible turning of the eyes. In the former instance, if glaucoma is present, normal tension may be the result, and in the latter, with which normal tension should have been obtained, the

tension may be increased and an erroneous diagnosis of glaucoma made.

The normal tension for an infant has been set at 24 mm. of mercury. If the child has no symptoms of glaucoma, however, and the tension amounts to 30 mm. of mercury, a negative diagnosis is justifiable. On the contrary, if the child has symptoms of glaucoma, such as photophobia, epiphora or blepharospasm, a tension of 30 mm. of mercury should lead to a positive diagnosis of glaucoma.

Obviously, the exact age of onset is difficult to determine. Scheie,[1] however, in a study of 362 cases of congenital glaucoma, has offered the following tabulation as to the time of onset:

At or before birth	47%
At the age of 6 months	31%
At the age of 1 year	10%
At the age of 6 years	10%
Beyond the age of 6 years	2%

The course of the disease varies. It can be a mild, slowly developing glaucoma with symptoms so mild as to be entirely overlooked for many months or even years, visual acuity remaining normal or near normal, while at the other extreme it may be a rapidly developing disease producing rapid decline in visual acuity and early blindness.

The cause of congenital glaucoma was thought at first to be the absence of the canal of Schlemm, and little or no attention was given to any other possible malformation of the angle of the anterior chamber. More recent studies, however, with the use of the gonioscope and laboratory data obtained by ocular section, have in a measure disproved this theory by revealing that Schlemm's canal is present in a large percentage of these cases, although not all; some of the eyes thus far sectioned have indeed shown absence of the canal. Studies have demonstrated that in an undetermined number of these eyes, examined on section and with the gonioscope, the iris is inserted into the trabecula, thereby preventing the escape of aqueous from the anterior chamber by blocking off the trabecula.

Another cause that seems plausible has been suggested by Maumenee.[2a] The longitudinal fibers of the ciliary muscle[2b] pass forward beyond the scleral spur and are inserted into the trabecula instead of into the scleral spur, as is usual. In such a case the action of the muscle fibers tends to close the canal of Schlemm rather than to open it. This theory is strengthened by the fact that in myotic persons there is failure to regulate the intraocular tension, and by the additional fact that in the performance of goniotomy these longitudinal fibers from the ciliary muscle are cut, thereby freeing the canal of Schlemm.

In the opinion of Scheie,[3] gonioscopic examination of the angle of the anterior chamber is of little diagnostic value in cases of infantile glaucoma. The picture suggests a palisade-like pattern in the peripheral pigment of the iris.

ZUSAMMENFASSUNG

Der Verfasser weist darauf hin, dass das angeborene Glaukom seltener als das im Erwachsenenalter erworbene ist, und dass die Aufmerksamkeit des Allgemeinpraktikers und des Kinderarztes notwendig ist, die Erkrankung zu entdecken und bei ihrem Auftreten zu behandeln. Er zählt die klassischen Symptome der Erkrankung im frühen und vorgeschrittenen Stadium auf und erwähnt einige der mutmasslichen Ursachen.

RÉSUMÉ

L'auteur note que le glaucome congénital est plus rare que le glaucome acquis à l'âge adulte. Il signale la nécessité d'une grande vigilance à la fois de la part du praticien de médecine générale et du pédiâtre, dans le diagnostic et le traitement du glaucome. Les symptômes classiques de

la tumeur au stade précoce et aux stades plus avancés sont énumérés, et des hypothèses sont émises quant aux causes de cette affection.

RIASSUNTO

Avendo osservato che il glaucoma congenito si manifesta meno di frequente di quanto non faccia il glaucoma acquisito nell'età adulta, l'autore sottolinea la necessità di stimolare l'attenzione dei medici e dei pediatri per rivelarlo e curarlo quando si presenta Elenca i sintomi classici dell'affezione negli stadi precoci e in quelli vanzati e suggerisce alcune cause presunte.

RESUMEN

Habiendo notado que el glaucoma congénito es menos frecuente que el adquirido en la edad adulta el autor apunta brevemente la necesidad de estar alerta por parte del médico general y del pediatra para detectarlo y tratarlo cuando se presente. Se enumeran los clásicos síntomas del tumor tanto en los casos incipientes como en los avanzados y se sugieren algunas causas de la afección.

SUMARIO

Observando que o glaucoma congênito, ocorre menos frequentemente do que o adquirido na idade adulta, o A. resumidamente aponta a nessecidade de se alertar o clínico geral e o pediatra na pesquisa dos mesmos e seu tratamento assim que ocorram. São enumerados os sintomas classicos do tumor, tanto nas fases iniciais como avançadas, sendo sugeridas algumas causas.

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People's beliefs have various causes. One is that there is some evidence for the belief in question. We apply this to matters of fact, such as "what is so-and-so's telephone number?" or "who won the World Series?" But as soon as it comes to anything more debatable, the causes of belief become less defensible. We believe, first and foremost, what makes us feel that we are fine fellows. Mr. Homo, if he has a good digestion and a sound income, thinks to himself how much more sensible he is than his neighbor so-and-so, who married a flighty wife and is always losing money. He thinks how superior his city is to the one fifty miles away: it has a bigger Chamber of Commerce and a more enterprising Rotary Club, and its mayor has never been in prison.

—*Russell*

Congenital Glaucoma: Treatment

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Congenital glaucoma and the various forms of treatment thereof are discussed, with mention of trephining and inclusion of the iris, both of which have proved unsatisfactory. The author points out that goniotomy has been successful in approximately 70 per cent of cases, with 10 to 15 per cent additional cures made possible by the addition of goniopuncture. The technic of these procedures is described in detail.

SINCE just before the first World War the standard treatment for congenital glaucoma was one of the filtering operations. Some surgeons favored the trephine operation; others, various forms of iris inclusion. Unfortunately, these were seldom successful in controlling the ocular tension, and the visual results were poor. It was not until Barkan introduced goniotomy in the late 1940s that there was any hope of successful treatment for congenital glaucoma. Since the publication of his papers describing the technic of goniotomy, its value for this purpose has been proved by numerous reports from all over the world.

Goniotomy is successful in curing congenital glaucoma in about 70 per cent of all cases. In a further 10 per cent or 15 per cent it may be cured by performing in addition, goniopuncture. This operation is really a filtering operation. It was introduced by Scheie in 1950.

In cases of congenital glaucoma the obstruction lies between the anterior chamber and the canal of Schlemm. Miotic therapy is therefore valueless, and the only treatment consists of opening the angle surgically so that aqueous can reach the canal of Schlemm.

Preoperative Care.—After a physical examination to exclude any systemic abnormality that would contraindicate operation, 3 drops of 5 per cent Prostigmin should be instilled, one drop every half hour, starting two hours before the operation. A miotic pupil is essential, because it facilitates avoidance of damaging the lens with the goniotomy knife and assists the surgeon to see into the angle.

Diamox is also given for twenty-four hours before the operation, to reduce the ocular tension as much as possible.

A general anesthetic is required. The anesthetist should insert an endotracheal tube and use either ether or fluothane.

Operative Details.—As soon as the infant is anesthetized the ocular tension should be measured, each of the three weights being used and the average measurement recorded. One snag is that the anesthetic itself reduces the ocular tension considerably. The tonometric readings, therefore, are not wholly reliable; nevertheless, they have considerable comparative value. The corneal diameter should then be measured.

If the cornea is cloudy, a drop of glycerine will help to clear it. Sometimes it is necessary to scrape off the epithelium in order to see through the cornea. If the palpebral fissure is too small, it is wise to do a lateral canthotomy.

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In my own practice, the contact lens of Barkan and the goniotomy knife designed by Scheie have been most satisfactory for this operation. Shaffer has recommended the Zeiss operating microscope, but I have found the Keeler binocular loupe highly satisfactory. The illumination is provided by a spotlight, held by a nurse close to the right temple of the operating surgeon (Fig. 1). She is instructed to keep the light pointed at the tip of the goniotomy knife throughout the procedure. Barkan recommended that the assistant should fix the eye and that the surgeon should hold the goniolens in the left hand and the goniotomy knife in the right. I have found it more satisfactory to have the assistant hold the goniolens while I use my left hand to fix the eye. Either method, however, is perfectly satisfactory provided one practices the movements a number of times with the assistant and the nurse holding the spotlight before one actually inserts the knife into the anterior chamber of the eye.

The patient's head is rotated to the side opposite the eye to be operated on. The contact lens is applied to the eye after the surgeon has made sure there are no bubbles in the saline solution between the lens and the cornea. The goniotomy knife is inserted about 2 mm. inside the edge of the cornea, so that, on its removal, there is less risk of the iris adhering to the inner aspect of the wound and causing an anterior synechia. An oblique wound through the cornea is so made that it will act as a trap door and prevent the escape of aqueous when the knife is withdrawn. The tip of the knife is slowly passed across the eye. It is better to pass either below or above the pupil, in order to make sure that

Fig. 1.—Use of binocular loupe and spotlight during gonioscopic study.

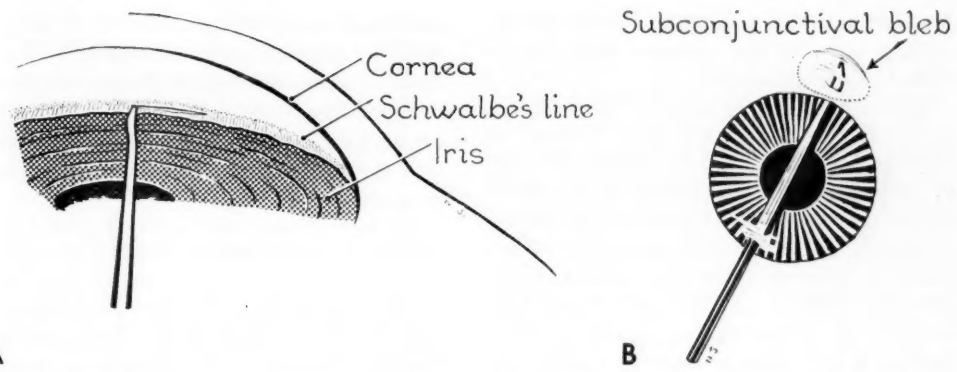

Fig. 2.—*A*, goniotomy using the operating goniolens. *B*, goniopuncture to produce a filtering subconjunctival bleb.

the iris is always between the knife and the lens. The knife is then passed so as to cut through the trabeculum just posterior to the line of Schwalbe (Fig. 2). No more than one-fourth of the blade should cut into the trabeculum. This insures a cut no deeper than 0.5 mm. From one-quarter to one-third of the circumference of the angle may be cut at one operation.

If, during this time, aqueous escapes and the anterior chamber becomes shallow, or if bleeding obscures the angle, the knife should be withdrawn at once to prevent further damage. On removal, the back of the knife should be pressed gently against the edge of the wound to prevent enlarging it as the blade passes through. Air should then be injected into the anterior chamber.

Next, the patient's head is then turned so that the incised area of trabeculum is uppermost. If this is done, air rises to fill the incised area, and if any bleeding occurs it falls to the opposite side of the anterior chamber. Pilocarpine, 1 per cent, is instilled into the eye, and the eye is padded.

When the infant is returned to bed it is wise to tie the arms so as to maintain the head in the correct position, with the incised area uppermost.

Maumenee has designed an instrument that fills the anterior chamber with air by means of a hollow cannula. If the anterior chamber is filled with air in this way, no gonion lens is required. I have had no experience with this method, but some ophthalmologists prefer it to the use of Barkan's gonion lens.

Scheie's Operation (Goniopuncture).— If the ocular tension is still high after two or three segments of the eye have been goniotomized, goniopuncture is indicated. The aim of this operation is to form a channel passing from the anterior chamber into the subconjunctival space. Before the goniotomy knife is inserted, saline solution is injected under the conjunctiva where the corneoscleral wall is to be incised. This is done to prevent the knife from passing out through both the sclera and the conjunctiva. The knife is therefore pushed into the angle so that it cuts through the sclera and into the subconjunctival space (Fig. 3). This usually results in some bleeding.

Complications of Goniotomy and Goniopuncture. — Hemorrhage: Hemorrhage after goniotomy is fairly common, but if the trabeculum only is cut with the goniotomy knife and the incision is not too deep, it is surprising how little bleeding occurs.

A slight ooze can usually be stopped by injecting air into the anterior chamber to raise the ocular tension.

Severe bleeding is usually due to a cut in the iris or the ciliary body, caused by placing the incision too far posterior. This is a much more serious complication. Some advise that the blood should be removed by irrigating the anterior chamber, but I have found it difficult to do this satisfactorily. My own opinion is that more harm may be done by irrigating repeatedly than by leaving a little blood, which is readily absorbed and is usually gone in two or three days.

Anterior Synechiae: If the anterior chamber is not filled with air, a synechia may develop therein as a result of adhesion of the iris to the inner aspect of the corneal wound. If this should occur, it is wise to separate it seven to ten days later.

Prolapse of the Iris: This is unlikely if the proper goniotomy knife is used, because the incision is too small. If, however, the incision is enlarged inadvertently as the knife is removed from the eye, iris prolapse may quite easily occur. The treatment is to excise the iris and suture the wound.

Infection: Infection has been reported and would require intensive antibiotic therapy, both systemic and subconjunctival.

Iridodialysis: This complication may arise from making the goniotomy incision too far posteriorly so that the iris is cut at its root.

Traumatic Cataract: The most likely time for this to occur is when the knife is being advanced across the anterior chamber. The risk may be reduced by passing the knife either above or below the pupil, so that it is always in front of the iris.

Prevention: All of these complications are much more likely to occur if the patient is inadequately anesthetized. If the child is light and there is any coughing or "bucking," the knife should be withdrawn at once from the eye and the operation stopped until adequate anesthesia has been obtained.

ZUSAMMENFASSUNG

Das angeborene Glaukom und die verschiedenen Formen seiner Behandlung werden erörtert. Die Trepanation und Einschliessung der Iris, die sich beide als unbefriedigend erwiesen haben, werden erwähnt. Der Verfasser weist darauf hin, dass der Einschnitt am Winkel der vorderen Augenkammer in etwa 70 Prozent der Fälle erfolgreich ist, und dass weitere zehn bis fünfzehn Prozent von Heilungen durch zusätzliche Punktionen des Augenkammerwinkels möglich sind. Die Technik dieser Eingriffe wird in ihren Einzelheiten beschrieben.

RÉSUMÉ

L'auteur discute le problème du glaucome congénital et les différentes formes de traitement de cette affection; il mentionne à ce propos la trépanation et l'inclusion de l'iris, procédés qui tous deux laissent à désirer. L'auteur signale que la goniotomie a été efficace dans environ 70% des cas, à quoi il faut ajouter 10 à 15% de guérisons additionnelles rendues possibles par une goniopuncture complémentaire. Les techniques de ces méthodes sont décrites de façon détaillée.

RIASSUNTO

Viene discusso il problema del glaucoma congenito e delle sue varie cure, particolarmente la trapanazione e l'inclusione dell'iride, entrambe insoddisfacenti. L'autore fa presente come la goniotomia riesce utile

in circa il 70% dei casi, oltre ad un altro 10-15% di successi che si possono ottenere mediante successive goniopunture. Viene descitta dettagliatamente la technica di questi metodi.

RESUMEN

Se trata en este trabajo sobre el glaucoma congénito y las diversas formas de tratamiento, con mención del trefinado y la inclusión del iris, dos métodos que no se han provado satisfactorios. Señala eal autor que la goniotomía ha sido satisfactoria aproximadamente en un 70 por ciento de los casos con 10 a 15 por ciento de curaciones adicionales hechas posibles por la adición de la goniopunctura. Se describe en detalle la técnica de estas intervenciones.

SUMARIO

Discute-se o glaucoma congênito e suas varias formas de tratamento, com menção à trefinação e inclusão da iris, sendo ambos insatisfatorios. O A. assinala que a goniotomia foi bem sucedida em aproximadamente 70% dos casos, com 10 a 15% de curas adicionais tornadas possiveis, acrescentando-se a goniopuntura. A tecnica dêsses procedimentos é descrita em detalhes.

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No man, for any considerable period, can wear one face to himself, and another to the multitude, without finally getting bewildered as to which may be the true.

—*Hawthorne*

Great hypocrites are the real atheists.

—*Bacon*

He reminds me of the man who murdered both his parents, and then, when sentence was about to be pronounced, pleaded for mercy on the grounds that he was an orphan.

—*Lincoln*

Treatment of Congenital Cataract

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BECAUSE visual acuity is so important to the development of a child both mentally and physically, the subject of congenital cataract certainly has a preponderant place in ophthalmology. And yet, in reviewing the literature, one finds that up to now ophthalmologists have not definitely agreed upon the best methods of treatment. It is evident, from what statistics are available, that the results of operation on congenital cataract are not always successful from a practical point of view. In the classification of congenital cataracts a great many types are mentioned. In practice, it is obvious that the important features of an opacity are its size, its density, its location and, above all, the extent to which it affects vision. Most authors (Chandler, Cordes, Ellis and Haik, Jules François and others) do not consider surgical treatment indicated when the visual acuity is 20/70 to 20/50 or better.

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A short presentation of the treatment of congenital cataracts is made, in which are discussed the indications for surgical intervention, the importance of the age factor and the various surgical technics. From this it appears that the most useful methods of operation are discission and linear extraction, with or without iridectomy. The use of α-Chymotrypsin is mentioned, and postoperative complications are discussed.

When one knows that a congenital cataract is becoming an impediment to visual acuity, a debatable question arises: "When should it be operated upon?" Here authors are not in complete agreement. According to a statistical report by Papapanos and Schenk on the results of operation for cataract during the first ten years of life, children with congenital cataract due to fetal iridocyclitis have little vision after the operation, which should therefore not be performed until the child is 4 or 5 years old. In cases of total congenital cataract of both eyes, without inflammatory processes, and in cases of incomplete cataract with severe involvement of both eyes, operation should be performed during the first year of life; otherwise, as has been pointed out by Chandler, nystagmus will appear owing to the lack of proper visual acuity. When only one eye is affected by a dense cataract, amblyopia is bound to result in that eye even if this eye is operated on, since, as a rule, neither the child nor his parents will tolerate occlusion of the good eye long enough for the visual acuity of the surgically treated eye to increase significantly. In borderline cases, with moderate involvement of both lenses, it is best to wait and see how the child gets along. Again, it is best not to consider operation for some time, at least, when a child with bilateral dense central opacities can still obtain useful vision simply by having the pupils dilated. In cases of partial cataract it is best to wait for surgical intervention until the fourth or fifth year of life.

In general, one should keep in mind that operations done on children under 2 years of age give inferior results because of the

incidence of complications. The parents of a child with congenital cataract, therefore, should be told about the dangers and pitfalls of surgical treatment and the limited results to be expected.

Needless to say, a complete preoperative ocular examination should be done, since it is obvious that the results obtained will influence the choice of the operation.

At this point, it is well to review briefly the different methods used in operating for congenital cataracts. Some of these are well known; others are less familiar, and a new concept favors α-Chymotrypsin. This will be appraised a little later.

Discission.—This is surely the best known technic and the one most frequently used. It consists chiefly in making a vertical and a horizontal incision in the anterior capsule of the lens with a knife-needle. One of the prime requisites for discission is that, before the operation, the pupil must dilate *easily* and fully, otherwise, subsequently, there is danger of posterior synechiae and all the complications that go with a small pupil. A point to remember: The more frequently a discission is repeated, the more frequently complications occur.

Zeigler's V-Shaped Through-and-Through Discission: This procedure is performed with the same technic as simple discission, except that the knife-needle cuts through both the posterior and the anterior capsule. The multiplicity of complications renders its use very infrequent.

Moncreiff's Operation.—This too resembles simple discission, except that multiple incisions are made in all directions and the anterior chamber is washed out of cortical material.

Linear Extraction.—Linear extraction is rapidly becoming the operation of choice. It consists, after a limbal keratome incision, of tearing off the anterior capsule with toothed forceps and taking it out. Regardless of the degree of success obtained with the first bite, the toothed forceps should not be reintroduced into the eye, for fear of grasping the forward-displaced posterior capsule and causing vitreous loss. After the opening of the anterior capsule, the cortex of the lens is milked out with the help of a spoon; then the anterior chamber is irrigated, and this is followed by air injection. One operation is usually sufficient, since absorption is rapid.

Combined Discission and Linear Extraction.—This technic requires first an elaborate discission, followed later by a linear extraction to remove lens material.

Iridectomy and Linear Extraction.—This operation is employed when the pupil will not dilate properly.

Wheeler's Discission.—This is used in cases of shrunken cataract, after cataract and membrane formation, and consists of cutting through the membrane across the pupillary area with a knife-needle, the tip of which passes into the vitreous. Vitreous loss, retinal detachment and glaucoma may follow.

Capsulotomy for Occlusion of the Pupil.—This consists of cutting with special scissors the thick membrane of capsule and lens that often remains. This is followed by the injection of air into the anterior chamber.

Optical Iridectomy.—Optical iridectomy, which is done in the inner lower quadrant, may help when visual improvement is obtained from dilating the pupil. Its results, however, are usually disappointing.

α-Chymotrypsin.—The use of this enzyme in the surgical treatment of cataract in infants and children has been strongly condemned, both at the Academy Meeting in Chicago in 1958 and at the 1958 International Course of Ophthalmology at the Instituto Barraquer in Barcelona. Opposition was based on the grave danger of vitreous loss, since the enzyme only dissolves the zonule and does not affect the

embryonic adhesions of the vitreous to the lens. Jenkins and Raiford, however, in the *Southern Medical Journal*, January 1960, reported successful results of the use of α-Chymotrypsin in a series of 26 patients under 15 years of age, without vitreous loss. Girard and his co-workers also reported 12 cases at the Pan-American Ophthalmological meeting in Caracas in January 1960. In 2 cases there was loss of vitreous.

It is generally agreed that (1) linear extraction is the operation of choice if the pupil dilates easily prior to the operation; (2) linear extraction with iridectomy should be done if the pupil does not dilate easily before operation, and (3) discission is to be used in cases of membranous cataract, shrunken cataract or "after-cataract."*

Surgical and Postoperative Complications.—These consist mainly of loss of vitreous, inadequate opening of the pupil, glaucoma and retinal detachment.

Vitreous loss is most frequently encountered in the various linear extractions and capsulotomies. In an effort to prevent it, pressure should be applied to the eye just before operation. Repeated use of the capsule forceps and its use in discission should be avoided. Vigorous manipulations and irrigations are also causes of vitreous loss.

Inadequate opening of the pupil may be caused by a drawn-up pupil or a pupillary membrane. This can be prevented by doing a full iridectomy in those cases in which the iris does not dilate well before operation. Strong use of mydriatics and hydrocortone is advocated when a dense inflammatory membrane appears postoperatively.

Glaucoma is a more frequent complication of needling than of linear extraction, particularly if there are repeated needlings. When it is associated with discission, the cause may be inadequate opening of the anterior capsule with subsequent swelling of the lens. In these circumstances immediate linear extraction is indicated, and so it is when there is blockage of the angle by lens cortex. In linear extraction, the use of mydriatics and hydrocortone may prevent severe inflammatory reactions causing anterior synechiae and secondary glaucoma. A peripheral iridotomy is indicated when vitreous blocks the pupil, causing glaucoma with iris bombé or anterior synechiae. In such cases, the prognosis is poor.

Retinal detachment usually occurs quite some time after the operation. It is due to prolonged inflammation creating a membranous formation, which in turn starts traction on the retina. As a rule, detachment is more frequent after needling than after linear extraction, and treatment has a poor prognosis.

Surgical Prognosis.—The prognosis is reserved in all cases of congenital cataract, because a great many patients also have other congenital ocular anomalies. In only 50 per cent of cases does operation result in vision of 20/100 or better. Nonetheless, visual improvement can be offered to the aphakic eye by the use of a scleral rest type of vented contact lens, according to Spaeth and O'Neil's report in the *American Journal of Ophthalmology* for March 1960. Furthermore, sight-saving classes and visual improvements by low vision aids are suggested in Lebensohn's article in the same journal, issue of December 1958.

ZUSAMMENFASSUNG

Es liegt eine kurze Darstellung der Behandlung angeborener Linsentrübungen vor, wobei die Indikationen zum chirurgischen Eingreifen, die Bedeutung des Lebensalters und verschiedene chirurgische Techniken erörtert werden. Daraus geht

*At operation, the surgeon may be helped by fluorescent illumination as described by Hague in *American Journal of Ophthalmology* for May 1959.

hervor, dass die nützlichsten Operationsverfahren die Spaltung und geradlinige Herausziehung mit oder ohne Resektion der Iris sind. Die Anwendung von Chymotrypsin wird erwähnt, und postoperative Komplikationen werden erörtert.

RÉSUMÉ

L'auteur donne une brève description du traitement des cataractes congénitales et discute les indications de l'intervention chirurgicale, l'importance du facteur âge et les diverses techniques chirurgicales. Il ressort de cette étude que les méthodes opératoires les plus utiles sont la discission et l'extraction linéaire, avec ou sans iridectomie. L'auteur mentionne l'emploi de l' α-chymotrypsine et discute les complications postopératoires.

RIASSUNTO

Vengono esposti i principi di terapia della cataratta congenita, le indicazioni all'intervento chirurgico e le varie tecniche in uso. Il metodo più utile è rappresentato dalla discissione ed estrazione lineare, con o senza iridectomia. Viene ricordato l'impiego della chimotripsina e discusse le complicazioni post-operatorie.

RESUMEN

Se hace una bereve exposición del tratamiento de las cataratas congénitas con estudio de las indicaciones para la intervención quirúrgica, de la importancia del factor edady de varias técnicas quirúrgicas. Parece deducirse que el mejor método de operación es la discisión y la extracción linear con o sin iridectomía. Se menciona el empléo de la quimotripsina y se hacen consideraciones sobre las complicaciones postoperatorias.

SUMARIO

É feita uma curta apresentação do tratamento de catarata congênita, na qual são discutidas as indicações operatórias, a importancia do fator idade e, as varias tecnicas cirurgicas. Parecem ser, a dissecção e extração linear, com ou sem iridectomia, os métodos cirurgicos mais úteis.—É mencionado o uso da quimotripsina e discutidas as complicações post-operatorio.

Herodotus informs us, that "so wisely was medicine managed by the Egyptians, that no physician was allowed to practise any but his own peculiar branch." Accouchments were exclusively the province of females.

These practitioners were remunerated by the state; and they were severely punished, when, by any experimental trials, they deviated from the prescribed rules imposed upon them, and, in the event of any patient dying under a treatment differing from the established practice, the medical attendant was considered guilty of a capital offence. These wise provisions were made, says Diodorus, in the full conviction that few persons were capable of introducing any new treatment superior to that which had been sanctioned and approved by old practitioners.

—Millingen (circa 1837)

Plastic and Reconstructive Surgery

Unilateral Facial Deformity and Restoration of Symmetry

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AND
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ANY discussion of facial deformity could include a wide variety of functional and structural, congenital, traumatic or postsurgical problems. In this article we shall consider the face in relation to one structural problem—asymmetry.

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Facial hemiatrophy is not uncommon. Small defects can be satisfactorily corrected with free fat or fat and dermis grafts. Accurate correction of a large defect can be obtained by means of a tube flap to which an intact blood supply is available, via the wrist, until the new tissue has become vascularized and established as part of the face. The method is applicable to progressive subcutaneous hemiatrophy (Romberg's disease), traumatic asymmetry and facial hypogenesis. Tissue so transferred will grow as a child grows, and overcorrection is not necessary.

Unilateral asymmetry of the face due to progressive subcutaneous soft tissue loss is called facial hemiatrophy, or Romberg's disease. It may be accompanied by decrease or absence of sensation in the cornea; it is not associated with facial paralysis and is not accompanied by loss of skeletal substance.

Reconstruction of a deformed part is not satisfactory when a soft tissue defect is corrected with hard bone onlay grafts. The standard correction of this defect has consisted of the use of free fat, free fat and dermis or fat-dermis-fascia grafts. These are not in all instances satisfactory, especially in cases of severe involvement, owing to the unpredictable amount of absorption of fat in the graft. Many observers have had the experience of seeing an immediately adequate free graft "melt away." Stevenson[1] has suggested a 50 per cent overcorrection in an effort to retain sufficient bulk for good facial symmetry after absorption of fat has ceased. Cyst formation in a free graft has also caused some concern, but Peer[2] has shown that cyst formation from dermal appendages is negligible or absent. In 1953 Newmann[3] proposed transfer of fat and dermis in the form of a de-epithelialized tube flap for restoration of facial symmetry.

He theorized that the unpredictable absorption of transferred tissue would be controlled, at least in part, by transfer into the face of tissue that was at all times attached to an intact blood supply. He used the wrist as a carrier of an abdominal tube flap, which was left attached to the wrist until an adequate blood supply had grown into the flap from the face. Newmann[3] noted that absorption of fat as observed in free grafts did not occur. He had anticipated some absorption, however, and excess fat in the tube graft had to be trimmed away later.

Hemiatrophy of the face may vary from slight to extreme (Fig. 1). It is not to be expected that all degrees of asymmetry can be corrected by the extensive and multiple-stage procedures necessary for the burial of a tube flap in the face. Small defects require only small grafts, and the chance that a single small graft will survive without absorption is better than when large free grafts are used (Fig. 2). Large defects require large grafts for replacement. Large free grafts may be poorly vascularized throughout; cystic liquefaction and absorption of fat, therefore, are extensive. Large free grafts may also drift. Poor or delayed vascularization results in poor healing and delayed attachment of the graft to surrounding tissues. The pull of gravity is reflected, in some instances, in a drift of the graft, producing unsightly operative asymmetry. This same imbalance can, of course, result from any poorly placed free or pedicled graft and well warrants repositioning with slings of fascia that run through the graft and are anchored to the zygomatic arch (Fig. 3).

Correction of severe facial asymmetry (Fig. 4*a*) can be accurately done, with assurance of vascularization, good healing and proper graft placement, and without absorption of the fat or dermis of the graft when the transferred tissue has an active blood supply at all times. This is accomplished by the function of a generous abdominal tube flap transferred to the wrist (Fig. 4*b*). About three weeks later the tube flap is transferred to the face, the wrist being used as a carrier and blood supply line (Fig. 4*c*). Before implantation into the facial subcutaneous space through

Fig. 1.—Severe hemiatrophy of the face (hypogenesis).

Fig. 2.—Mild hemiatrophy. Small fat-dermis free graft used to establish facial balance.

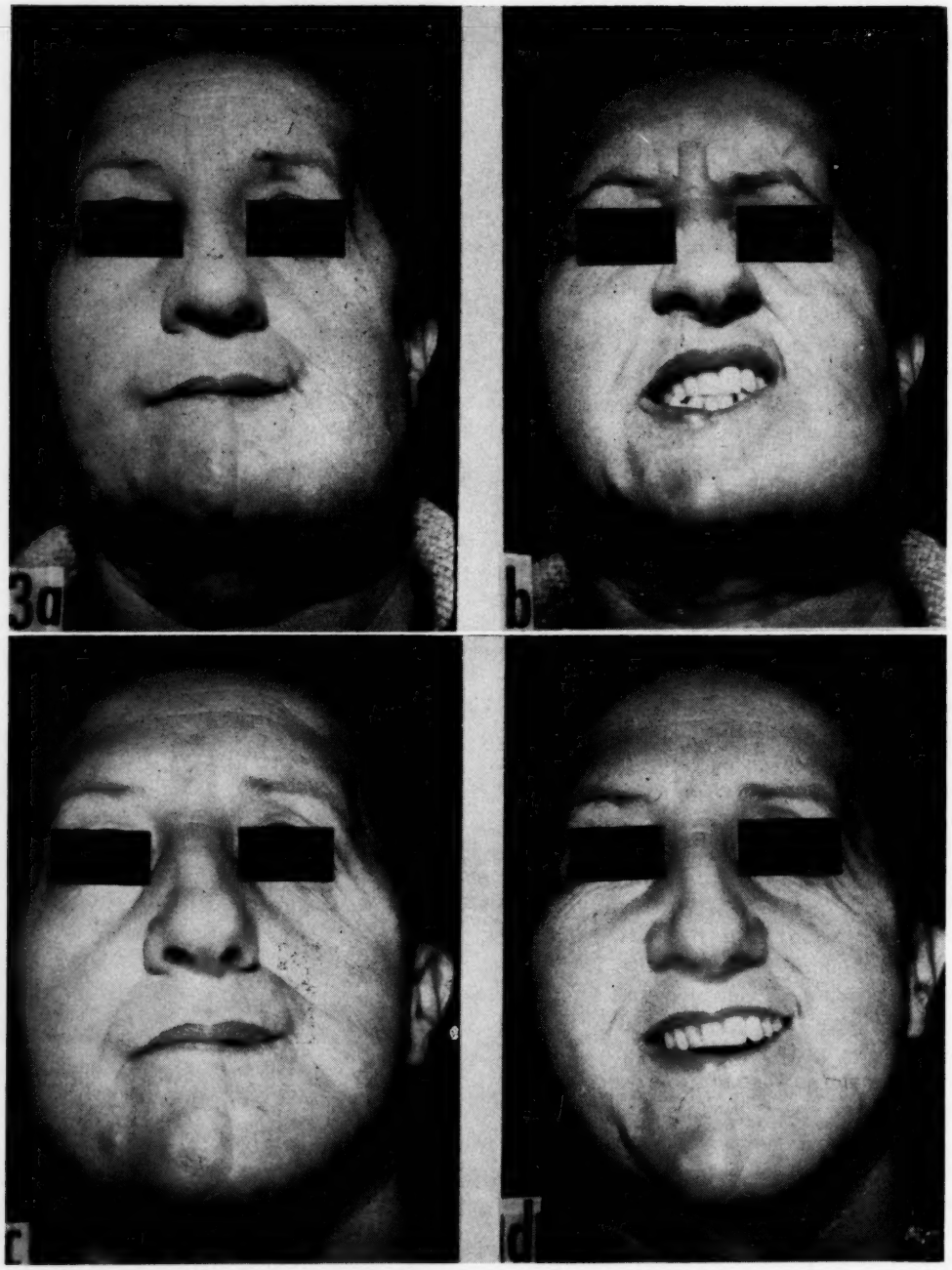

Fig. 3.—Severe hemiatrophy (Romberg's disease). Poorly placed pedicle inlay graft and repositioning of graft with fascia slings. This postoperative asymmetry may result from gravitational drift in large free fat grafts.

Fig. 4.—Severe hemiatrophy of the face (*a*). Generous abdominal tube flap attached to wrist (*b*). Epithelium removed from opened tube flap. Tube, using wrist as "blood supply line," threaded into face through submandibular incision and within hair temporal incision (*c*). Final correction, four years after first operation (*d*). Overcorrection is not necessary, for fat absorption does not occur as in free fat graft.

a submandibular incision (Fig. 4*c*), the tube is opened. It is unrolled, except at its attachment to the wrist, and the epithelium is removed. This may be done by free hand dissection, with a dermatome or, most easily, by surgical abrasion with the wire brush technic. The tube may be split to produce a "tail" for infarorbital placement and another for extension along the temporal area. The opened tube is pulled up into the facial subcutaneous space through an incision within the hair in the temporal region (Fig. 4*c*). Overcorrection is unnecessary. The implant should be fashioned with maximal accuracy if facial symmetry is to be established. The tube is anchored to the temporal fascia, and the dermis of the tube is severed from the wrist and set into the submandibular area (Fig. 4*d*). The vascularized tube will grow with the patient, and overcorrection in a child is not necessary.

RÉSUMÉ

Les cas d'hémiatrophie faciale ne sont pas rares. Les petites surfaces sont restaurées de façon satisfaisante par des greffons adipeux libres ou des greffons adipeux et dermiques. Les surfaces étendues bénéficient d'un lambeau en tube provenant du poignet. Cette méthode de restauration de la symétrie faciale est applicable aux cas d'hémiatrophie sous-cutanée progressive (maladie de Romberg), d'asymétrie traumatique et d'hypogénèse de la face. Cette technique de transplantation tissulaire chez les enfants, permet aux tissus de se développer normalement avec l'âge, et évite des réinterventions correctrices.

RIASSUNTO

L'émiatrofia facciale non è frequente. I difetti minori vengono corretti soddisfacentemente con trapianti di grasso libero o di grasso e cute; quelli maggiori necessitano di trapianti tubulati con peduncolo vascolare la cui connessione deve essere mantenuta fino a che nuovo tessuto vascolarizzato non si sia formato nella faccia. Questo metodo di ricostruzione della simmetria facciale è applicabile in caso di emiatrofia sottocutanea progressiva (malattia di Romberg), asimmetria traumatica e ipogenesia della faccia. I tessuti trapiantati cresceranno assieme al bambino e non necessitano di ulteriore correzione.

RESUMEN

La hemiatrofia facial no es infrecuente. Los pequeños defectos se corrigen satisfactoriamente con injertos libres de grasa o de grasa y piel. Los defectos grandes se corrijen con colgajos tubulares que se ha logrado vascularizar bién y que en estas condiciones, y a través de la muñeca, se hacen llegar a la cara. Estos métodos de restauración de la simetría facial son aplicables en casos de hemiatrofia subcutánea progresiva (Enfermedad de Romberg), asimetría traumática e hipogénesis de la cara. Los tejidos implantados han de crecer con el niño y por eso la supercorrección es innecesaria.

SUMARIO

A hemiatrofia facial não é rara. Defeitos pequenos são satisfatóriamente corrigidos com enxerto de gordura ou derma e gordura. Grandes defeitos são bem corrigidos com um retalho tubular, cujo suprimento sanguineo esteja intacto, via tronco, até que o novo tecido se integre na face. Êste metodo de restauração da simetria da face é aplicável em casos de hemiatrofia subcutânea progressiva (doença de Romberg) assimetria traumática e hipogênese da face. Os tecidos assim transferidos crescerão com a criança, daí não haver necessidade de hiper-correção, nem mesmo por provável absorção gordurosa.

ZUSAMMENFASSUNG

Die einseitige Gesichtsatrophie ist kein ungewöhnliches Vorkommnis. Geringe Defekte lassen sich befriedigend mit freien Transplantaten von Fett oder Fett und Haut ausgleichen. Grosse Defekte können genau korrigiert werden mit Hilfe eines Hohllappens, der seine Blutversorgung über das Handgelenk so lange behält, bis das neue Gewebe vaskularisiert ist und im Gesicht festsitzt. Dieses Verfahren zur Herstellung der Symmetrie des Gesichts lässt sich in Fällen von progressiver subkutaner Hemiatrophie (Rombergsche Krankheit), bei traumatischer Asymmetrie und bei Entwicklungsstörungen des Gesichts anwenden. Das so transplantierte Gewebe wächst mit dem Kinde, und daher erübrigt sich eine Überkorrektur, wie sie bei Fetttransplantaten wegen der Fettresorption angewandt wird.

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Jacobi relates the case of a man confined in the lunatic asylum at Wurtzburg, in other respects rational, of quiet, discreet habits, so that he was employed in the domestic business of the house, but who laboured under the impression that there was a person concealed in his stomach, with whom he held frequent conversations. He often perceived the absurdity of this idea, and grieved in acknowledging and reflecting that he was under the influence of so groundless a persuasion, but he never could get rid of it. "It was very curious to observe," adds our intelligent author, "how, when he had but an instant before cried what nonsense!—is it not intolerable to be thus deluded? and while the tears which accompanied these exclamations were yet in his eyes, he again began to talk, apparently with entire conviction about the person in his belly who told him that he was to marry a great princess. An attempt was made to cure him, by putting a large blister on his abdomen, and the instant that it was dressed, moving from behind him a dressed-up figure, as if just extracted from his body. The experiment so far succeeded that the patient believed in the performance, and his joy was at first boundless in the persuasion that he was cured; but some morbid feeling about the bowels, which he had associated with the insane impression, still continuing, or being again experienced, he took up the idea that another person similar to the first was still left within him, and under that persuasion he still continues to labour."

—Millingen (circa 1837)

Research in Plastic Implants

Their Use in Augmentation for Amastia or Hypomastia

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THE SUBJECT of replacement or augmentation of mammary tissue in cases of amastia or hypomastia is of vital importance to women, as well as men, in a large percentage of the Caucasian race.

It is beneficial to women emotionally disturbed or mentally deranged by this particular type of psychosis. Strangely enough, it is has great value with regard to the wearing of either day or evening clothes, imparting a feeling of well-being and social prestige, referable to the improved body contour.

When a woman is so unfortunate as to undergo a simple or a radical mastectomy, either unilateral or bilateral, this augmentation is extremely valuable in the restoration of womanhood. In treatment for the loss of any type of body tissue, it cannot be emphasized too strongly that replacement with autogenous tissues is ideal. There are many instances, however, in which this is impossible; a substitute for these tissues then becomes necessary.

The fact that plastic surgeons resort to implantation of a foreign material in the tissues of the body as replacement for lack or loss of tissue is certainly common knowledge. The specialty has come a long way since the use of glass balls, ivory balls and injections of paraffin. It is now more than eight years since a plastic material has been used for augmentation or reconstruction of the breasts of patients with various types of amastia, congenital or acquired, or hypomastia.

An account of the original results and procedures was given by myself at the First International Congress on Plastic Surgery in Stockholm in 1955. At that time it was ridiculed and scoffed at. Today the use of these plastic materials is accepted in many areas of the United States. The fear of the most frightening possible complications has, not as yet, been justified by the results. To date, I have not encountered any reports that the implan-

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The use of plastic implants for augmentation in cases of hypomastia or amastia is exhaustively described. Replacement or augmentation of mammary tissue is vitally important not only from the surgical but from the cosmetic, and therefore the psychic, point of view. Various implants have been used for this purpose, from injected paraffin and ivory ball prostheses to Ivalon sponge, polyethylene and polyurethane. Experimentation on rabbits with the latter materials indicates that a polyurethane ester, here designated Code F, is nearest the ideal. The effects on the human subject, as observed by the author over a period of years, are similar to those obtained with experimental animals.

tation of a plastic material has produced carcinoma in the human body.

Many more plastic surgeons in the United States are now using plastic implants. The type of implant that is being used and can be used safely is the subject of this article. Progress is continually being made in the discovery of these plastic materials, and in all probability that someone will one day be astute enough to produce a special type of material that has the exact qualifications to meet the needs of the human body. Today the materials in use are the most desirable of those already available.

Until the year 1955 I had used Ivalon sponge (a polyvinyl plastic material). In Denmark I learned of the use of polyethylene prostheses and used these for a time. After about one year, experiments with various other materials were conducted. In the past few years a polyurethane substance has been used, the physical properties of which will be described.

Reaction to these materials by the human body, their advantages and disadvantages, their various types, and the surgical technic of their application will be discussed.

I have employed the results of research procedure to determine the characteristics of various types of plastic material as implants used for augmentation in cases of hypomastia or for reconstruction if the breast is totally absent.

The problem, of course, lies in determining which of the various implants give the maximum number of the ideal required results, and also in amassing essential information that can be utilized in the development of a material as nearly perfect as possible. The research program I adopted necessitates the following procedures:

1. Determination of the pressure in millimeters of mercury in order to estimate the amount of compressibility required for the resilience necessary to maintain the desired form of the breast, as indicated also by the weight of the mammary tissue available.

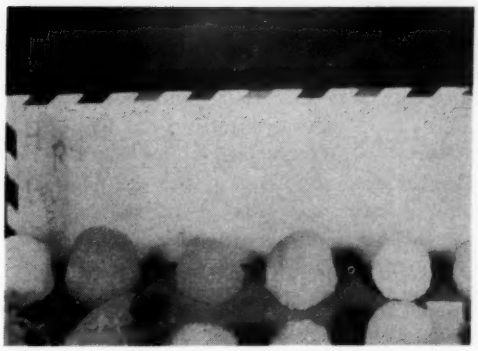

Fig. 1.—Appearance of implants used. Each was identified by code.

2. Determination of the amount of implant material necessary to allow compensation for the compressibility of the breast, in order to maintain the size desired.

3. Determination of extent of reaction of the various implants to the same host or hosts similar in size, shape, age and weight, under the same living conditions and the same dietary regime.

4. Measurement of the amount of tissue invasion into the various implants under these same conditions.

5. Determination of the weight and firmness of the various implants under the same conditions.

6. Determination of the weight and firmness of the various implants, in relation to time and the type of reaction.

7. Examination for any evidence of carcinoma.

8. Determination of the action of the implants within a polyethylene sac:

   a. Dry implants.
   b. Various solutions.
   c. Staphylococcic and streptococcic infections.

Method of Study.—The experimental animals selected for research were rabbits. All were anesthetized by intravenous injection of 2 per cent pentothal sodium. All rabbits were treated on the same day under the same conditions. A strictly aseptic technic was employed. All implants were sterilized as best indicated for the particular material.

The materials used, here to be indentified by code, were as follows:

A. Ivalon sponge	(Polyvinyl)
B. Polyethylene	(Denmark)
C. Polyurethane	(Surgifoam)
D. Polyurethane	(Grade 2)
E. Polyurethane	(Grade 3)
F. Polyurethane	(Grade 1)

These materials will be referred to as Code A, Code B, Code C, Code D, Code E, and Code F.

A photograph was taken of each of the materials in the raw state, to be identified by codes as aforementioned. A physical description of each material before insertion and after removal from the animal was recorded. The blood pressure in millimeters of mercury was taken before insertion and after removal of the implant from the animal. Photographs were taken of the implant *in situ* before removal and also of the implant sectioned to expose the center. Microscopic section of all materials before and after removal was done to demonstrate changes in physical characteristics and pathologic reaction to the implant. A histological description was recorded of as many of the aforementioned materials as were available by recovery from human beings.

Results.—The properties of each material as used under a definite code name were as follows:

Code A (Ivalon) (Polyvinyl Alcohol).—This material is very porous and open in structure. The separations between the vacuoles were irregular and membrane-like.

Density: The density is approximately 1.5 per cubic foot.

Tensile Strength and Elongation: Tensile strength varies according to the piece tested, because of the difference in size of the vacuoles.

Compressibility: This material is soft when wet and hard when dry. Its resilience is slow; it recovers slowly from compression.

Heat Resistance: The material is not heat-resistant from the point of view of autoclaving; it can be boiled and can be autoclaved under special circumstances.

Code B (Polyethylene).—This substance has an open structure and is, therefore, extremely porous. There is no standard pore size.

Density: The density is approximately 1.4 to 1.7 per cubic foot.

Tensile Strength: The tensile strength is poor; the strands come apart when pulled.

Compressibility: The compressibility of polyethylene is comparable to that of Ivalon when Ivalon is wet, but, owing to the many separations of the bands, it has more compressibility when wet and less when dry.

Resilience: The resilience of this substance, either wet or dry, is higher than that of Ivalon, but it does not "set" when wet and recovers much more rapidly than does Ivalon.

Code C (Surgifoam).— The porosity of Surgifoam is less than in that of polyethylene, the vacuoles being much smaller and the membranes between taking the form of threads rather than that of membranes, so that the filling of the areas with air or solutions gives them a lesser degree of distensibility. This makes the density of this material higher than that of polyethylene.

Tensile Strength: The tensile strength of this material is more nearly uniform

and at least 20 per cent greater than that of polyethylene.

Resistance to Tearing: Similarly, the resistance of the individual fibers to tearing is much higher.

Resilience: The resilience of Surgifoam is much higher than that of either Ivalon or polyethylene.

Code D (Polyurethane, Grade 2).—Porosity: The porosity of this material is very small, and its structure is not open as compared to that of Surgifoam.

Density: The density is about 2 pounds per cubic foot.

Tensile Strength: This material has a low resistance. The plasticizer is much increased.

Resistance to Tearing: Resistance is low; the material is easily torn.

Compressibility: Compressibility is high but, since this is a soft material, it does not respond readily after it has been immersed in solution. The "feel" is soft, and the specimen does not recover its normal shape readily; its resilience, therefore, is quite low.

Code E (Polyurethane Grade 3).—Porosity: The porosity of this polyurethane substance is good, owing to its open structure; material with large pores is much more compressible than is one with closed structure and few pores.

Density: The density of this material varies from 1.7 to 2.2 pounds per cubic foot, and the greater the density the greater the weight as well. The materials of this type of higher density, are not as "workable" as those of lower density.

Tensile Strength: The tensile strength of Code E varies with the density.

Compressibility: Compressibility also varies with the density of this particular type of polyurethane, but they all recover rapidly after compression.

Resilience: Resilience is good.

Code F (Polyurethane Grade 1).—Porosity: The pores of this material are fine pores, and its structure is in the form of minute threads; the pores surround all the threads. An individual piece 1 mm. thick has the appearance of lace; it is therefore almost completely open in structure and is translucent.

Fig. 2.—General appearance of an implant sectioned *in situ*.

Density: The density is about 1.4 pounds per cubic foot.

Tensile Strength: The tensile strength is better than that of other forms tested.

Resistance to Tearing: The property of elongation without tearing or distorting, is better than that of any material tested thus far. Resistance is very high making it possible to sew or glue the implant without tearing.

Compressibility: Code F is very soft, has a wool-like "feel" and can be draped like a woven fabric. Despite its softness, it shows no tendency to "set" and recovers rapidly from compression.

The accompanying table presents the various tensions recorded.

Tension in Millimeters

	Before Insertion	*After Removal*
Code A	15	20
Code B	5	18
Code C	4	15
Code D	2	13
Code E	4	13
Code F	4	14

Experimental Study.—The average weight of the rabbits was 5½ pounds. Implants were inserted as follows:

Rabbit 1, Code A, right side; Code B, left side.

Rabbit 2, Code C, right side; Code D, left side.

Rabbit 3, Code D, right side.

Rabbit 4, Code E, right side; Code D, left side.

Rabbit 5, Code D, right side; Code F, left side.

The implants were placed along the anterior portion of the thoracic wall of each rabbit after the skin had been thoroughly disinfected. An incision 1 inch (2.5 cm.) long was made through the skin and subcutaneous tissue; these were elevated and a pocket formed to permit insertion of the plastic material, and the incision was then closed with a No. 3 silk suture. A similar procedure was carried out with all the rabbits. The animals were tagged. All survived.

On April 8 the first 3 rabbits were killed and the implants removed. The compressibility in millimeters of mercury was taken. Photographs of the implants, sectioned in half *in situ*, were taken. These specimens were placed in solution of formaldehyde and taken to the laboratory for microscopic sectioning and examination. The microscopic reports are as yet not available. These will be published as soon as they are ready.

The implants removed from Rabbit 1 (Code A and Code B) showed extremely hard material (Code A) on the right side, completely encapsulated. On section, it was difficult to open. On the left side, which had contained Code B, this was completely absorbed, so that the area could not be sectioned.

Rabbit 2 contained, on the right side, Code C (Surgifoam) and on the left side Code D (polyurethane, Grade 2). The excised specimen from the right side showed a soft implant in comparison to those previously examined. The material was firm, but not as hard or lacking in compressibility as those previously mentioned. The implant from the left side (Code D) was much contracted, much smaller and decidedly hard, without any compressibility, and with a pressure much higher than that of the aforementioned specimens.

Rabbit 3 (Code D, polyurethane Grade 3) showed slight drainage without infection, merely serous; the implant material was soft and showed slight absorption.

Rabbit 4 (Code E on the right side and Code D on the left) showed slight drainage from Code E. There was no infection, and the implant was soft. The implant of Code D (polyurethane Grade 2) was hard and contracted, with no drainage.

Rabbit 5 (Code D, right side; Code F, left side); Code F (polyurethane Grade 1) right side; *in situ* pressure of this material was 4 on implantation and 4 on removal. On section, the center of the implant showed no gross changes.

Second Phase of Experiment.—The purpose of this phase was to determine effect of enclosure of the various types of implant in polyethylene bags 1 mm. thick, i.e., to observe (a) whether they absorb or lose fluids; (b) whether they maintain their resilience and softness; (c) whether they are affected by normal, hypotonic

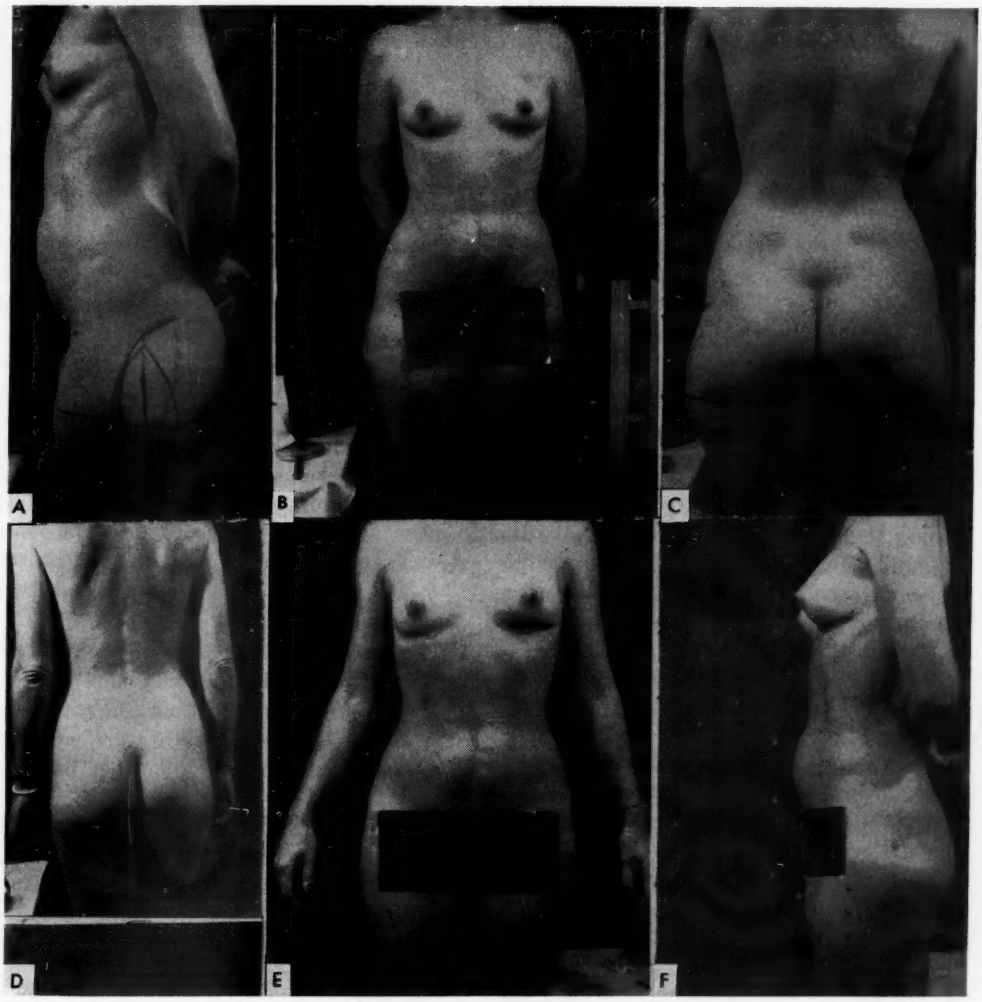

Fig. 3 (Case 1).—*A*, markings on thigh prior to operation; preoperative appearance of breasts. *B*, front view of thighs and breasts prior to operation. *C*, preoperative rear view. *D*, postoperative rear view. *E*, front view one year after operation (application of derma-fat graft from thighs and buttocks). Note absorption of graft, and irregularity of breasts. *F*, side view after implantation of plastic foam. Note scar on thighs from earlier derma-fat graft.

or hypertonic solutions; (d) whether they permit passage of infected material, and (e) their effect on the sponge. Dyes were used as indicators to determine the extent of change in *P*h produced in each instance.

The implants boiled for one hour, sealed in the sack. The following additives were placed in the sack: (1) drops of gentian violet, (2) drops of methylene blue, and (3) 2 cc. of physiologic solution of sodium chloride. Dry implants were also tested.

Also implanted were the following solutions and substances: (a) hypertonic sa-

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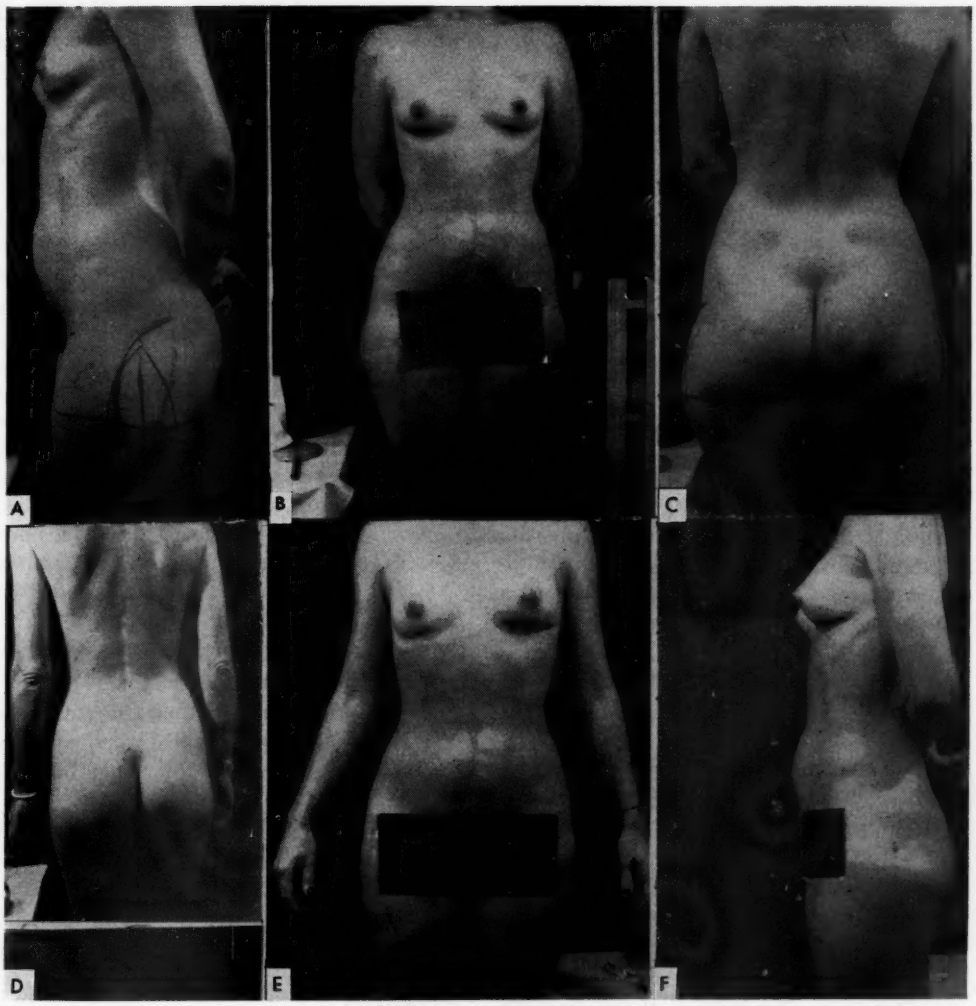

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Also implanted were the following solutions and substances: (a) hypertonic sa-

line solution, (b) hypotonic saline solution, (c) whole blood, (d) plasma, (e) material infected with staphylococci and (f) material infected with streptococci.

The second phase of the experiment was divided into three groups. In Group 1 there were 4 rabbits. In 1 rabbit the Ivalon, in a polyethylene sack, was infected with Staphlococcus aureus. In another, infection with Streptococcus, Code D, was employed. The third rabbit was given polyurethane and blood plasma, and in the fourth, polyurethane in whole blood was used.

The implants were placed on May 19, 1959 and removed on June 15, 1959. The results were as follows:

The implant with the staphylococcic infection had become about three times its original size and was under very high tension; in its removal, purulent material began to ooze through the polyethylene sack.

Rabbit 2 in this series, which was infected with the streptococci, died after the first week.

In Rabbit 3, which contained polyurethane and blood serum, absorption was complete and the serum was discharged when it was opened. In the implant containing whole blood there was no evidence of any prosthesis.

The results in the first 2 instances are conceivable, but the end results in the last 2, which were numbered 889 and 887 respectively, suggest the possibility that the plastic materials may be absorbed by body fluids, since there was no evidence of an infection in the implants containing the blood and the plasma.

The second group of implants was as follows:

Rabbit 888 was implanted on the right side with physioloic solution of sodium chloride containing Ivalon.

One implant contained hypertonic saline solution; 1 contained 2 per cent gentian violet; 1 contained red blood cells in physiologic solution of sodium chloride, with no sponge, and 1 contained the soft polyurethane in 25 per cent alcohol.

The rabbit containing the physiologic saline solution showed no evidence of the implant and no evidence of any increase in size, and the polyethylene sack had disappeared. On the left side there was no trace of either the implant or the sack.

In Rabbit 888, which contained the implant with 2 per cent gentian violet in physiologic solution of sodium chloride, the implant was not visible, and the sutures in the skin were still present. From the general appearance it was impossible to tell whether the polyethylene sack had slipped out or been completely absorbed. There was no evidence of any discoloration from the gentian violet, and the No. 3-0 silk with which the area had been sutured was not visible.

In Rabbit 882, which contained the normal saline solution and blood cells on one side, and 25 per cent alcohol with polyurethane (Grade 2), both were missing. There was no evidence of either of these sacks.

In Group Three, Rabbit 897, with surgical polyurethane in physiologic solution of sodium chloride implanted on the right side, was intact. In the right side the polyurethane was present. It was soft and wet, as when originally placed.

In Rabbit 891, the implants containing methylene blue were not present.

In Rabbit 895, the implants containing polyethylene in a hypertonic saline solution were present and soft, and there was a considerable increase in the circumference of the sack.

In 1 rabbit, the number of which was lost, the polyurethane implant in a polyethylene sack in sterile water was still present and moist, and one polyurethane ester in a polyethylene sack with gentian

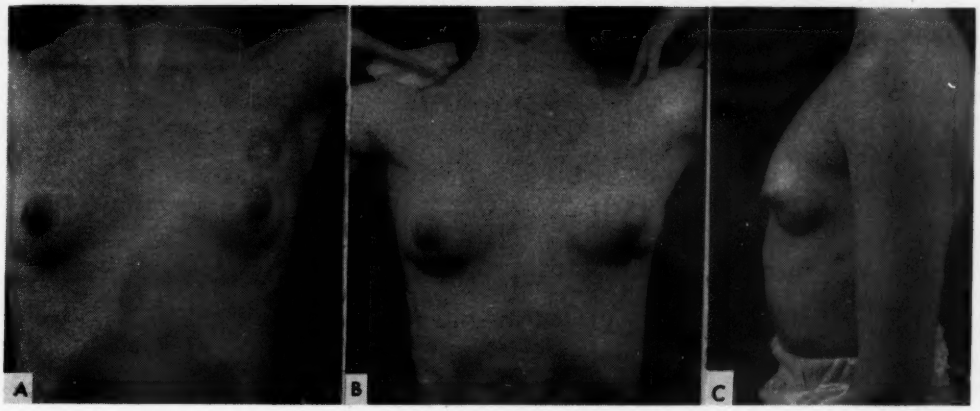

Fig. 4 (Case 2).—*A*, front view of small breasts before implantation. *B*, small breasts after use of small implant. *C*, side view of result.

violet was still wet. There was no change in size.

From this small group of animals and the short period of time during which they were subjected to the absorption experiments, it is quite evident that several changes occur, concerning which positive deductions cannot be made. It is evident from the general observations that implants containing infected material may either destroy the animal as did the streptococcus inoculation, or cause the development of purulent material within the sack which could subsequently rupture the sack and contaminate the entire animal.

The complete absorption of the polyethylene sacks containing the liquids aforedescribed and no plastic material may tend to show that there is a complete change in the fluids, which destroys the sack and its contents.

The polyethylene sack containing hypertonic saline solution showed a swelling at the bottom. The contents of this area were sent, intact, to the laboratory.

Those containing blood plasma and whole blood in the polyethylene sacks were sent to the laboratory; in the right side, in which polyurethane had been implanted, the implant was intact and was sent to the laboratory; in the left side, in which the polyethylene sack had contained only whole blood, there was no sign of the sack or its contents.

The pathologic reports on the various plastic materials and comparable pathologic reports on materials similar to three of the types of implant used in this study, all of which are available, will be compared to show the results in man and in laboratory animals.

The illustrations show the complete experimental procedure as described. They also show the implants in their natural state, both those used for the laboratory animals and those employed in man, as well as those of a similar character that were removed for certain reasons in each particular case.

At the time of writing, except for the conclusions derived from clinical experiments with the various implants, the plastic material polyurethane ester designated as Code F, a description of which has been given, is, in my opinion, the most nearly ideal type of polyurethane. It is easily autoclaved under various conditions; it is easily shaped and it produces a lesser re-

action in the body tissues than does any of the other plastic materials thus far used. Clinical observation of the last three types of polyurethane over a period of three years has convinced me of the superiority of the material; it shows no clinical evidence of absorption, and it retains tactile characteristics, evident when first inserted, over a considerable period—at the time of the present report, about three years. It does not become hard, as does Ivalon; it does not have as much resilience as has Ivalon or polyethylene substances, including the so-called Surgifoam, and it maintains its form in spite of the pressure involved in wearing a brassiere.

On one occasion drainage was evident for about three days, but the fluid was serous, occurring on one side only, and no more than 5 cc. of fluid was expressed. This appeared to be localized in the region of the suture line. The suture line was red in this particular area for a distance of about 1 cm. It was opened and fluid expressed in the amount aforementioned, and within three days it had completely healed.

In another case in which the implant was used, after about two weeks and complete healing of the wound, the patient was injured on one side. After the injury the breast swelled. The suture was opened and a considerable amount of blood and blood clots removed. Pressure was then applied to the breast, and healing took place in about four days. No evidence of any other pathologic change was observed as a result of using this particular type of polyurethane.

In a large series of implants some reaction was provoked by the polyurethanes previously employed.

This experiment also proves, to my mind, that the polyethylene sacks, if not broken through and of the proper porosity, may contain the implant and keep it from absorbing body fluids to any significant degree. In such instances the only purpose of the polyethylene sack is to keep the plastic material from becoming absorbed, fibrosed or hard. It may be noted, however, that if the sack is sufficiently porous to permit osmosis of fluid it does not serve the purpose for which it was intended, i.e., to keep the sponges from becoming indurated.

Attempts have also been made, with the same purpose, by searing the surfaces of these implants, but the end results were the same.

The experiments were conducted to determine, if possible, which of the many different types of foam in current use would serve most advantageously for the

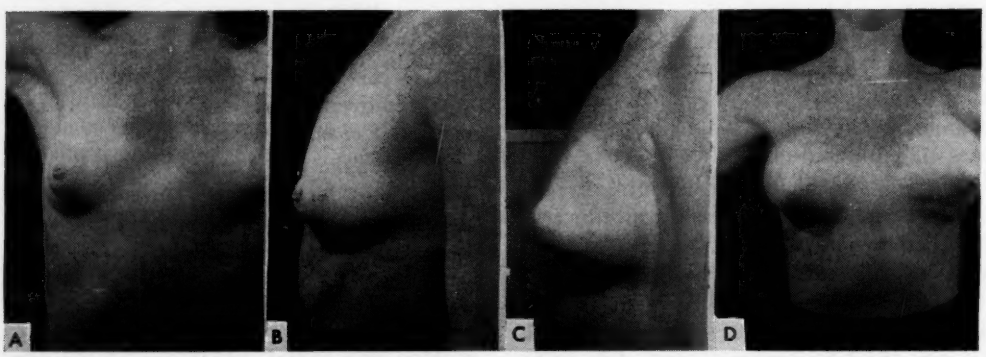

Fig. 5 (Case 3).—*A* and *B*, preoperative front and side views. *C* and *D*, side and front views after use of medium-sized implant.

Fig. 6 (Case 4).—*A* and *B*, front and side views of large breasts prior to operation. *C* and *D*, side and semi-front views after use of large implant.

purpose for which it was intended. The experiments dealt only with physical changes in the materials used and the transmission of these changes to the palpating hand.

In the course of the investigation several interesting supplementary observations were noted; e.g., the effect of the implants on the breast during and after pregnancy, and the effect of pregnancy on the implants. It was noted that the process of lactation had no effect one way or another on the implants; yet, because of engorgement of the breasts, the impression obtained by palpation was more nearly natural. There was no interference with lactation. No pain attributable to the presence of the implants was encountered.

After the physical characteristics of the various implants had been appraised, a choice was made of Grade D 700-5-30, manufactured by the Foam Division of a large company. This particular foam is a polyurethane polymer. The sponge used was selected on the basis of its flexibility and softness, which is probably due to the three-dimensional structure of skeletal strands alone, which has no membrane-like windows. In this manner it differs from other types of polyurethane. It is probable also that the open structure makes it more compressible and yet has no tendency to "set," as many equally soft foams do. The amount of resilience with the same degree of softness also appears to be greater.

The results of the animal experiments in this study were substantiated by several implants of the same kind, removed from human subjects for one reason or another.

While the study was in progress, it was rumored that the Japanese are using a foam formed by a polyol to which an activator is added prior to its use and permitted to react in the space created under the breast. Every effort has been made to obtain full information on this, with no success thus far.

In 1959 this was followed by some research by Mandarino and Salvatore, an account of which appeared in the *American Journal of Surgery*. The material used was produced by the William S. Merrell Company under the trade name Ostamer. It was used chiefly for fractures. Since this is a foam of high density, its use in an open area seems to have good possibilities.

With foams of low density the problem is more difficult. To adopt the same procedure, using foam of low density is a hazard, because this type of foam evokes a much higher exothermic reaction, so that temperature problems are encountered. Then too, in the breast one would be dealing with a closed wound, and in

a closed cavity the gaseous products associated with the reaction, such as Toluene di isocyanate vapors, amine vapors, might well be toxic and objectionable. Ostamer is a polyurethane prepolymer.

A typical report from the pathologist follows: "Specimen consists of a spongy plastic implant removed from the breast. It is brown and mottled. Its surface is considerably spongy, and on pressure the spongy soft material permits the egress of a bloody fluid.

"The specimen is ovoid and appears the same in its lateral projection. It is flattened on the undersurface and mounded on the external surfaces. Brownish-grey granulation tissue appears to infiltrate the spongy substance of the implant. Transection reveals spongy strandlike plastic material interlacing and intertwining to form the mass, and peripherally this has been condensed by brownish granulation tissue that appears to envelop the lesion.

"Microscopically, the sections show vascularized fibroareolar tissue densely infiltrated with inflammatory cells, predominantly lymphocytes, with plasma cells, and large areas of polymorphonuclears and a few eosinophils. There are also moderate numbers of hemosiderocytes, focally apparent. A few breast mammary lobules show apocrine metaplasia and are surrounded by large amounts of pale-staining, sparsely cellular connective tissue. One section shows multinucleated foreign body giant cells about spaces that contain some slight amount of basophilic amorphous material.

"*Impression:* Foreign body from subcutaneous portion of left breast, with overlying scar and proliferative granulation tissue and foreign body reaction with focal ulceration. Foreign body granuloma of breast."

Polyethylene Implant.—The use of foreign materials for augmentation of tissues has been in vogue for many years. The injection of paraffin was a favorite many years ago. It formed paraffinomas and produced some grotesque deformities when injected into the soft tissues. This was due to its low melting point. I have no knowledge about any reports of malignant change due to this practice.

Much work has been done with many materials in order to determine the carcinogenic factors in animals. In the past ten years many articles have been published and a great many plastic materials have been tested. Many authors have expressed the opinion that carcinogenesis is incidental to the normal susceptibility of mice to sarcoma. That phase of the research will be carried on by scientists who are well qualified for that type of experimentation. Reports are conflicting. The passage of time will eventually aid in our forming a reasonable consensus.

According to a survey recently made, not one substantiated case of carcinoma of the breast in a series of 8,000 collected cases has been produced by augmentation mammoplasty,

A recent article by Dr. W. C. Hueper, of the National Cancer Institute in Bethesda, Maryland, demonstrates some of the wonderful research that is being done. Much of this work has been done before, by Oppenheimer (B. S.), Oppenheimer (E. T.) and Stout, in 1948. Many others have done a considerable amount of research on the same subject. Their conclusions are different. This, however, in my mind does not prove any one more valid than any other. From Dr. Hueper's own comments, I cannot escape the impression that he is voicing a personal conclusion without sufficient scientific support. I quote: "While the cancers located remote from the sites of the implants were definitely, and/or most likely 'spontaneous' cancers, since they were of the same type and occurred in about the same number of those *found among animals of*

the control group, the cancers developing at the sites of the implants, must be considered as reactions to the deposited polyurethane polymers."

James Barrett Brown, at a recent meeting, commented: "In a series of 50 mice over a period of ten months, he found no tumors. Also, they now have another series of 50 mice, which they are watching for the period of their lives to determine whether they develop tumors."

In 1952, Fred Manifeld reported having observed a large implant for five years, without seeing any evidence of tumor.

This subject is of such serious import that an extremely cautious attitude should be taken in expressing a comment either pro or con, unless it can be unequivocally substantiated.

To some extent the physical changes of animals in which the various foams are implanted can supply a means of comparison with reaction to these same foams in man.

Over a period of years I have had the opportunity to remove implants of various materials from human breasts. Generally the properties and tendencies observed in implants removed from animals are comparable to those of implants removed from human subjects. The latter, being so much larger, were easier to compare as to size and hardness. Jens Bing of the University Institute for General Pathology, Copenhagen, and The Experimental Laboratory of "Ferrosan," in the same city, noted that polyethylene was absorbed to a lesser extent than was Ivalon. He concluded that Ivalon not only shrinks but is absorbed. He expressed surprise that Oppenheimer and others had found evidence of malignant change due to the sponges.

All the foams available at present undergo a period of regression after enlargement, owing to absorption of the fluids, which in turn is caused by the reaction of the tissues to the material. The secondary contraction manifested by the different foams accounts for the differences in hardness of the breast after the reaction has subsided.

Author's Note: I wish to thank Mr. G. U. Spaulding, Manager, and Mr. W. R. Powers, Production Manager, of the Foam Division of a large manufacturing company for their gracious assistance in teaching me a part of the chemistry and means of production of Plastic Foams. I wish also to state that the employees of this company at no time expressed any opinion as to the use of any of these foams in man. Also, neither I nor they have made any claims as to carcinogenesis, or noncarcinogenesis, of any foams.

They advised me only as to the chemical content of the foams that would give me the physical properties I determined would be the best suited for the need at hand.

I also wish to express my thanks to Dr. W. C. Hueper for his courtesy in forwarding a copy of his article "Experimental Production of Cancer by Implanted Polyurethane Plastic," before publication. I was especially concerned about the reports I had heard and I was anxious to study the details before giving this paper. Dr. Hueper is certainly a pathologist of stature, and one must take credence in any work he does; nevertheless, I must take issue with his statement of his conclusions.

I have just finished a survey from the mailing list of the plastic surgeons in the United States, with regard to plastic foams as carcinogenic agents. By actual count of those who responded, no cases of cancer reported from 8,000 cases or 16,000 implants in human beings since the inception of their use.

ZUSAMMENFASSUNG

Die Anwendung plastischer Implantate zur Vergrösserung der Brustdrüse in Fällen von Unterentwicklung oder Fehlen der Drüse wird erschöpfend beschrieben. Ersatz oder Vergrösserung der Brustdrüse hat nicht nur chirurgische Bedeutung, sondern ist auch vom kosmetischen und damit vom psychologischen Standpunkt aus von grösster Wichtigkeit. Von Paraffineinspritzungen und Elfenbeinprothesen bis zur Verwendung von Ivalonschwämmen, Polyethylen und Polyurethan gibt es eine Reihe von verschiedenen Implantaten,

die zu diesem Zwecke benützt werden. Versuche an Kaninchen mit den letztgenannten Materialien zeigen, dass ein hier mit Code F bezeichneter Polyurethanester dem idealen Implantationsmittel am nächsten kommt. Die Beobachtungen, die der Verfasser über eine Reihe von Jahren am Menschen gemacht hat, ergeben ähnliche Resultate wie die am Versuchstier erzielten.

RÉSUMÉ

L'utilisation d'implants plastiques dans les cas d'hypomastie ou d'amastie est décrite sous tous ses aspects. Le remplacement ou l'augmentation de tissu mammaire revêt une importance capitale non seulement du point de vue chirurgical, mais également du point de vue esthétique, et par là: psychologique. Des implants varies ont été employés, depuis les injections de paraffine et les prothèses d'ivoire, jusqu'à l'éponge d'lvalon, le polyéthylène et le polyuréthane. L'expérimentation sur les lapins de ces dernières substances, montre que l'ester de polyuréthane ici désigné sous "code F," est celle qui se rapproche plus de l'idéal. Les réactions de l'être humain telles que les a observées l'auteur au cours d'une période de plusieurs années, sont semblables à celles notées lors de l'expérimentation sur l'animal.

RIASSUNTO

Viene descritto diffusamente l'impiego di sostanze plastiche in casi di ipomastia o di amastia. La sostituzione o l'aumento del tessuto mammario è di grande importanza non solo dal punto di vista chirurgico ma anche estetico equindi fisico. A questo scopo sono state impiegate varie sostanze, dalle iniezioni di paraffina alle protesi con palle di avorio, alla spugna di Ivalon, polietilene e poliuretano. Lo sperimento in cavie con questi ultimi materiali dimostra che l'estere poliuretano è quello ideale. L'osservazione condotta per un periodo di molti anni ha dimostrato che nell'uomo i risultati sono uguali a quelli che si ottengono negli animali da esperimento.

RESUMEN

En este trabajo se describe exaustivamenteel uso de implantes plásticos en los casos de hipomastia o de amastia. La sustitución o el aumento del tejido mamarioes de importancia vital no solo desde el punto de vista quirúrgico sino también física y cosméticamente. Con este fin se han utilizado diversas sustancias como inyección de parafina, pelotas de marfil, polietileno, poliuretano y esponja de Ivalón. Experiencias llevadas a cabo en con jos han demostrado que el material mas próximo al ideales un ester del poliuretano al que se llma code F. De acuerdo con la experiencia de varios años del autor los efectos en los seres humanos son similares a los obtenidos en los animales de experimentación.

SUMARIO

O uso de inclusões plasticas para aumento, em casos de hipomastia ou amastia é exaustivamente descrito. A substituição ou aumento do tecido mamario é vitalmente importante, não somente do ponto de vista cirurgico, como cosmético e, consequentemente psiquico. Varios materiais tem sido usados nêste propósito, desde injeções de parafina e próteses de bolas de marfim, até esponjas de Ivalon, polietileno e poliuretano. As experimentações em coelhos com êste último material aqui designado com código F, é o que mais se aproxima do ideal. Os efeitos nos sêres humanos observados pelo A. durante um período de anos, são semelhantes aos obtidos nos animais de experimentação.

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It is interesting to consider the reasons for [Sir Henry] Thompson's success. It was due to unerring foresight, great care and outstanding skill, hard work and a certain amount of good fortune.

In the early part of the nineteenth century stone in the bladder was still a common disease, and the only well-known operation was the "cutting for stone." Even before he started his medical training Thompson knew of the recently introduced method of crushing a stone, owing to the fact that Heurteloup—as has been mentioned earlier—operated successfully on a patient near Framlingham. When Thompson started his hospital residency one of the first operations at which he assisted was that of a cutting for stone as the result of which the patient died. He wrote an account of this for publication and had reason to know of the perils of the operation. Crushing appeared to offer a much safer method, and he went over to Paris specially to learn the technique from Civiale, the originator of the method. Having learnt the technique, his care and skill enabled him to perform the operation to perfection and to improve the instrument with which it was done. Though he practised general surgery for a short time he soon limited his work to urinary surgery and became the first specialist in urinary diseases in this country. As Hale Bellot said of him: "His professional reputation was almost entirely as an urinary surgeon, and even his hospital practice was confined almost exclusively to his speciality." He became known as the most skilful man with the lithotrite, and after the successful operation on King Leopold his name was well known on the Continent, patients coming to him from all parts. For about thirty years he did an average of about thirty lithotrities each year. Apart from this he became an authority on the enlarged prostate, which had been the subject of his second Jacksonian Essay.

—*Cope*

Reconstruction of the Face and Cranium After Radical Operation for Basal Cell Carcinoma

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PAWTUCKET, RHODE ISLAND

IT IS important to remember that epitheliomas of the face, ears, eyelids, nose and scalp are mostly basal cell tumors, at least in their origin. The true basal cell epithelioma may start in some chronic growth, after an acute injury or spontaneously as a small pearly spot. Eventually it will assume the characteristics of its type, with early ulceration. It rarely shows early and rapid growth; it is most often decidedly indolent, and ulceration is relatively shallow.

The surgeon's most important objective in the treatment of a malignant lesion is complete and thorough extermination of the tumor. His second consideration is reconstruction of the conspicuous defect created by eradication of the tumor.

Usually one may immediately reconstruct the part, especially if the resected tumor was small, slow-growing and well differentiated on diagnostic biopsy. Procedures utilized in immediate repair are wide excision and application of a split graft, or of local flaps, or primary closure after wide undermining.

When complete removal of the tumor is doubtful or uncertain, it is safer to delay reconstruction after excision of the more malignant and complicated tumors. In this category are large tumors; previously treated neoplasms; tumors that involve osseous or cartilaginous structures, and oral or nasal cavities which, on microscopic examination, are observed to be extremely anaplastic.

Frequently one may cover the area where a tumor has been resected with a fine split graft, so as to keep it clean and prevent unnecessary secondary infection. Again, useful prosthetic appliances may be prescribed for the patient anticipating future reconstruction.

In reconstructing defects resulting from excision of a malignant tumor, the surgeon must pay close attention to nerve supply, muscle continuity, and blood supply. Whenever possible, the excision should take the direction of Langer's lines, even though greater areas of normal tissue may have to be excised to accomplish this.

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The case of a 70-year-old woman with extensive basal cell carcinoma of two and one-half years' duration, involving the scalp, forehead and right eyelid, is reported. Three surgical procedures have been performed with local anesthesia, including a bovine cartilage graft to eradicate the tumor completely and reconstruct the face and cranium. The importance of fenestrating the cartilage is pointed out. This procedure has produced early vascularization and fixation of the cartilage without suturing. Preoperative and postoperative photographs are presented.

Fig. 1.—Extensive basal cell carcinoma of face and cranium.

Tumors of the scalp and forehead are not infrequent. Unfortunately, the scalp is difficult to reconstruct and to cover adequately with hair. The only other hairy parts of the body of any considerable size are the suprapubic and axillary regions. For some patients the anterior aspect of the chest may supply hair. This, however, is a poor imitation of the normal hair of the scalp.

One must remember that the tissues of both the forehead and the scalp have an excellent arterial blood supply, which helps in transferring flaps. The main sources of arterial supply are the temporal and supraorbital arteries.

When a malignant tumor involves the scalp, one must not only remove the tumorous scalp but the periosteum, the galea and, in some cases, the external plate of the skull. Occasionally, when indicated, the entire thickness of the involved bone down to the level of the dura mater must be removed.

In the case here reported an extensive carcinoma of the forehead and cranium (Fig. 1) had existed for two and one-half years before the patient sought medical advice. Reconstruction was undertaken by the use of multiple procedures.

REPORT OF CASE

A white woman aged 70 was seen for the first time on Feb. 14, 1956. She complained of severe weakness, headache and dizziness.

Fig. 2.—Roentgenogram of skull, showing large irregular area of bone destruction in frontal bone.

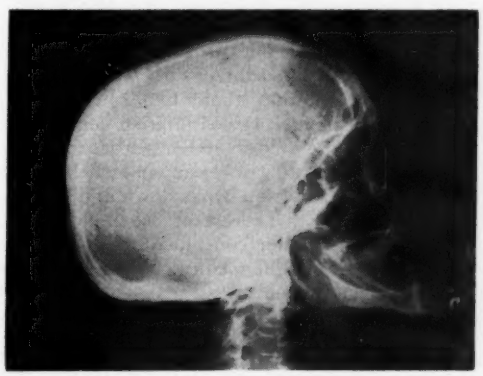

Fig. 3.—Lateral view, showing involvement of entire thickness of frontal bone.

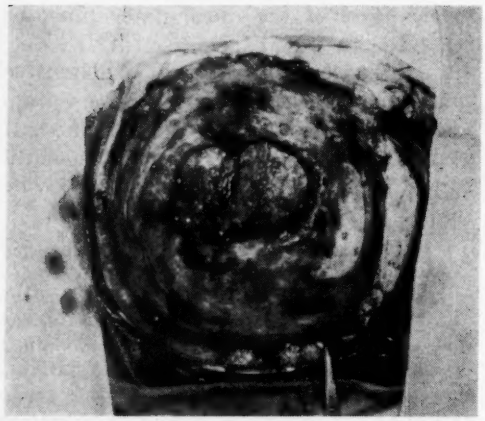

Fig. 4.—Resection of basal cell carcinoma, including involved frontal bone.

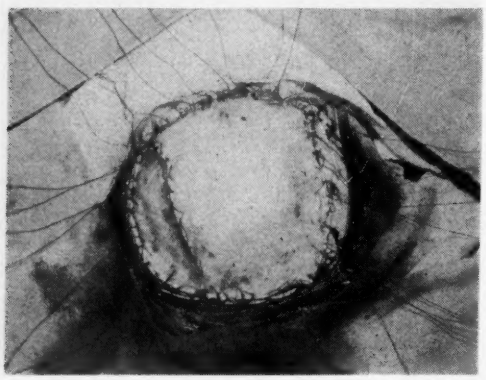

Fig. 5.—Area of face and cranium covered with split graft.

She also stated that for the past two and one-half years she had had progressive ulceration of the forehead, associated with bleeding. The history revealed that about two and one-half years earlier a small raised pinkish nodule had developed in the center of her forehead. This nodule continued to grow, and six months later the center of the lesion broke down and ulceration developed. Thereafter she bled frequently. The lesion continued to grow, but she had never sought medical advice until the date aforementioned.

Physical examination revealed the patient to be pale, weak and dehydrated but rational, alert and cooperative. The head was covered with grayish hair. Bands of hair beautifully camouflaged and concealed the tumor of the scalp and forehead. The tumor on the right side of the forehead had invaded the right eyebrow and eyelid. The edges of this lesion were raised and bled very easily. The center of the tumor presented erosion of the frontal bone, which was rough and irregular and had a moth-eaten appearance. At one point it appeared that the whole thickness of the frontal bone was destroyed. The lesion measured 5½ by 4½ inches (13.97 by 11.43 cm.). No glands were palpable.

The remainder of the physical examination revealed no essential abnormality except that the heart was slightly enlarged to the left and the blood pressure in millimeters of mercury was 160 systolic and 40 diastolic.

Roentgenograms of the skull and chest were taken on February 16. The report was as follows:

"Examination of the skull (Fig. 2 and 3) showed a large irregular area of destruction in the frontal bone on both sides of the midline, involving the left side somewhat more than the right. The area of destruction was situated roughly midway between the bridge of the nose and the coronal suture. It meas-

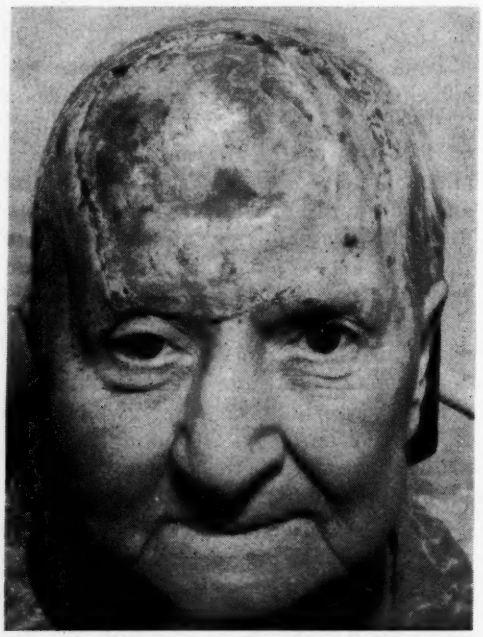

Fig. 6.—Front view showing complete take of split graft twelve days after operation.

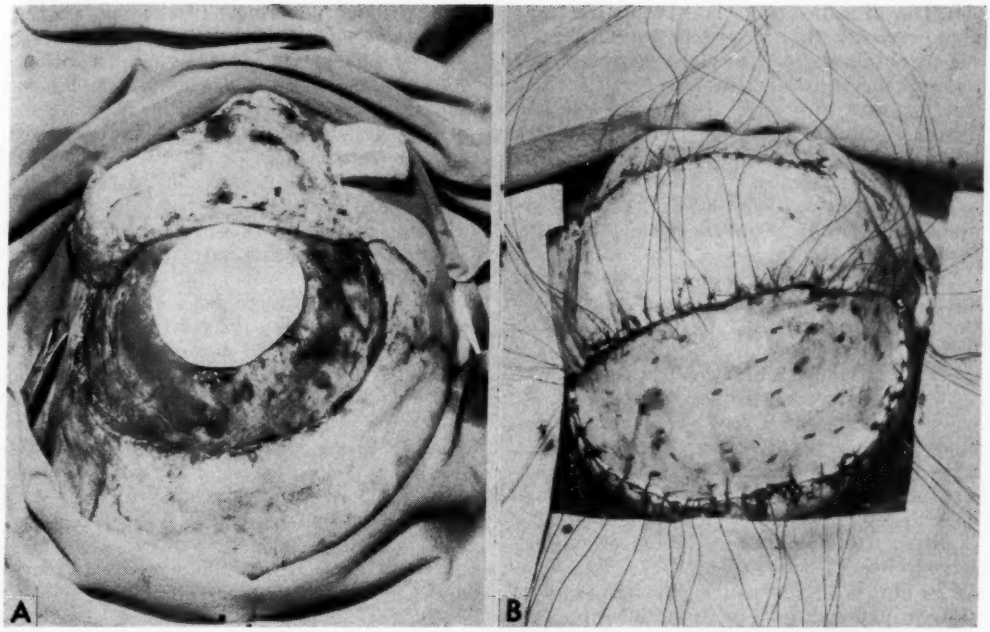

Fig. 7.—*A*, removal of greater portion of split graft. Bovine cartilage *in situ*, covering frontal bone defect. *B*, occipital flap, raised and positioned to cover bovine cartilage.

ured roughly 5 by 5 cm. It involved the outer table, the diploe and the inner table, the latter to a much less extent than the former. The margins of the area of destruction were irregular and frayed, with no increased density of the bone around the margins. There was no evidence of increased intracranial pressure.

"Conclusions: A large destructive process involves the frontal bone on both sides of the midline. The destruction involves the inner table as well as the outer table and the diploë. It is highly probable that this area of destruction represents direct extension of the tumor of the skin into the underlying bone."

Roentgenograms of the chest revealed no evidence of primary or metastatic neoplasm. The heart was slightly enlarged.

Laboratory work revealed the following data: There were erythrocytes per micro millimeter of blood, 3,180,000; Hgb. with 5.7 Gm. of hemoglobin, and 9,300 leukocytes, with 68 per cent polymorphonuclears, 24 per cent lymphocytes, 6 per cent monocytes, 1 per cent eosinophils and 1 per cent basophils. Anisocytosis and poikilocytosis were present.

The blood was of Type A and Rh negative. The value for urea nitrogen was 8 mg. per hundred milliliters; that for total protein 5.8 mg., and that for chlorides 99 mEq. per liter.

This patient displayed severe secondary anemia. On February 18 she was given 500 cc. of blood. Three days later the blood count was repeated and revealed 3,360,000 red cells per cubic millimeter, with 8.6 Gm. of hemoglobin. Moderate hypochromia, anisocytosis and poikilocytosis were present.

Blood transfusion was repeated on February 20 and again on February 21. On March 3 the blood count revealed 4,710,000 red cells per cubic millimeter, with 10.3 Gm. of hemoglobin. Urinalysis gave essentially negative results.

The patient was much improved by February 22, so that on this day the tumor was surgically excised (Fig. 4). Local anesthesia consisting of 1 per cent xylocaine circumferential infiltration, was induced in the forehead and scalp. During this procedure the entire lesion was removed from the anterior portion of the scalp, forehead, right eyebrow and eyelid. The section of frontal bone involved was also resected in its entire thickness, after which the frontal lobes were visualized. These were covered with meninges, which grossly appeared

to be free of metastases. This large defect was then covered with a large split graft (Figs. 5 and 6) obtained from the right thigh with the region under local anesthesia.

After this procedure the patient had an uneventful convalescence. The graft "took 100 per cent," and within two weeks the area was completely healed.

The pathologic diagnosis of the tumor removed was basal cell carcinoma of the scalp, forehead and frontal bone.

On March 9 patient underwent the second operation. The scalp was shaved. Again, with the region under local infiltration anesthesia induced with 1 per cent xylocaine, most of the previously applied skin graft was removed, with exposure of the frontal bone defect. A wide occipital pedicle flap was raised, undermined and moved forward. At the same time a large dome-shaped bovine cartilage (Fig. 7*A*) was prepared to fit the defect in the frontal bone originally removed on February 22. The cartilage was shaped to fit the defect and was fenestrated with a No. 16 gauze needle to allow fibrous tissue and capillaries to penetrate, thus obtaining complete and early fixation without suturing. *This procedure has produced early vascularization of the cartilage.*

After the cartilage had been fitted into the defect in the frontal bone, the pedicle flap was moved forward to cover it (Fig. 7*B*). The flap was sutured into the desired position with multiple interrupted No. 4-0 silk sutures. To cover the defect posteriorly to the pedicle flap, a split skin graft was cut from the left thigh and was utilized for this purpose. This surgical procedure was successful and without complications.

On March 21, again with local anesthesia, the two large "dog ears" of the occipital flap were removed and the flap revised (Fig. 8*A*). The left "dog ear" was utilized to reconstruct the right eyebrow, which had been excised because of infiltration of the malignant tumor.

After this last procedure the patient made an uneventful recovery. She was discharged from the hospital on March 28, the forty-third day in the hospital.

This patient has been well and ambulatory since March 28, 1956. She has gained weight and her appetite has been excellent. On her discharge from the hospital the final blood

Fig. 8.—*A*, occipital flap eight days after operation. *B*, hair growth on migrated flap and complete "take" of split graft.

Fig. 9.—*A*, final results two years after operation. Note new right eyebrow graft. *B*, right profile with hair combed to conceal split graft in center of cranium.

count revealed 4,700,000 erythrocytes per cubic millimeter, with 10.5 Gm. of hemoglobin. The final result is highly satisfactory. The hair has grown well (Figs. 8*B*, 9*A* and 9*B*), and the patient has been able to camouflage and conceal the split skin graft covering the forehead. The bovine cartilage graft has shown no evidence of absorption after nearly four years.

ZUSAMMENFASSUNG

Es wird über eine 70jährige Patientin mit einem zweieinhalb Jahre bestehenden umfangreichen Basalzellenkarzinom der Kopfhaut, der Stirn und des rechten Augenlides berichtet. Es wurden drei chirurgische Eingriffe in Lokalanästhesie einschliesslich eines Transplantats von Rinderknorpel zur völligen Beseitigung der Geschwulst und zum Wiederaufbau des Gesichts und des Schädels ausgeführt. Es wird darauf hingewiesen, dass es wichtig ist, den Knorpel mit Löchern zu versehen. Dieses Verfahren hat zur frühzeitigen Gefässversorgung und Fixierung des Knorpels ohne Nähte geführt. Der Arbeit sind Photographien der Patientin von vor und nach der Operation beigefügt.

RÉSUMÉ

L'auteur décrit le cas d'une femme de 70 ans atteinte d'un carcinome à cellules basales datant de deux ans et demi et s'étendant au cuir chevelu, au front et à la paupière droite. Trois opérations ont été pratiquées sous anesthésie locale (comprenant une greffe de cartilage bovin), en vue de l'extirpation totale de la tumeur et de la restauration de la face et de la surface cranienne. L'auteur signale l'importance de la fénestration du cartilage. Cette technique a permis une vascularisation précoce et la fixation du cartilage sans suture. L'article est illustré de photogra-

phies montrant l'état pré- et post-opératoire.

RIASSUNTO

Viene riferito il caso di una donna di 70 anni con un carcinoma basocellulare diffuso del cuoio capelluto, della fronte e del sopracciglio destro, datante da tre anni. In anestesia locale si fecero tre interventi e un impianto di cartilagine bovina, allo scopo di asportare completamente il tumore e ricostruire la faccia e il cranio. Viene sottolineata la necessità di fenestrare la cartilagine; questa tecnica ha determinato una precoce vascolarizzazione e fissazione della cartilagine senza bisogno di sutura. Vengono presentate le fotografie pre- e post-operatorie.

RESUMEN

Se da cuenta del caso de una mujer de 70 años que sufría un carcinoma de células basales de dos años y medio de duración y que afectaba el pericráneo, la frente y el párpado derecho. Se la practicaron tres operaciones quirúrgicas con anestesia local implantando un injerto de cartílago bovino reconstruyendo cara y cráneo después de la extirpación radical. Se señala la importancia de la fenestración del cartílago. Este proceder ha sido seguido de vascularización y fijación del cartílago sin sutura. Se acompaña el trabajo de fotografías pre y postoperatorias.

SUMARIO

O A. relata um caso de extenso carcinoma baso celular, em uma mulher de 70 anos de idade, com dois anos e meio de duração, envolvendo crânio, fronte e palpebra direita.—Três intervenções cirurgicas foram realizadas sob anestesia local, incluindo enxerto de cartilagem bovina, afim de erradicar completamente o tumor e, reconstruir a face e o crânio. A importancia da fenestração da cartilagem é assinalada. Esta manobra produziu vascularização precoce e fixação da cartilagem sem sutura. São apresentadas fotografias pré e post-operatorio.

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Today the American physician has perhaps the best opportunities in the world for learning and for advancing in his profession. But in order to be able to fulfill his task with dignity and efficiency, he must know the history of medicine in his country. He must be acquainted with its social and psychologic trends, with its correlation with the great historical streams that nurtured the evolution of the United States, and with the struggles and achievements of the great figures in American medicine. He must, in short, be aware of everything concerning the turbulent, dynamic past of medicine in this country, if he wishes to comprehend its majestic present and its prospects for the future.

—*Marti-Ibañez*

Granular Cell Myoblastoma of the Bronchus

Report of Two Cases and Review of the Literature

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AND
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Two cases of granular cell myoblastoma of the bronchus are presented. The literature concerning this tumor in this location is reviewed, and its histogenesis and significance are discussed.

GRANULAR cell myoblastoma is an infrequently observed tumor that occurs in various organs; its site of predilection is the tongue,[1] but it has also been reported as occurring with relative frequency in the skin, breast, and maxilla. The bronchus, however, is a rare site.[2] Because of the rarity of this tumor in this location and the significant features observed in 2 patients, a report seems pertinent.

REPORT OF CASES

CASE 1.—A 36-year-old Negro meat packer was admitted to Cook County Hospital on Sept. 18, 1956, with a history of severe productive cough associated with mild, diffuse abdominal pain of three weeks' duration. In the three-week period before admission he had had several bouts of chills and fever, associated with severe anorexia and a loss of approximately 20 pounds (9.1 Kg.) in weight. Hemoptysis was not noted. The patient had had pneumonia in 1941.

Physical examination revealed him to be well developed and without severe respiratory distress. The blood pressure in millimeters of mercury was 110 systolic and 76 diastolic; the pulse rate, 92 per minute; the respiratory rate, 20 per minute, and the rectal temperature, 101 F. Dullness over the right lung base, with increased fremitus, was noted. Roentgenograms of the chest taken on admission showed an area of density in the right base of the right lung. Laboratory data were essentially normal except for moderate leukocytosis (12,600 leukocytes per cubic millimeter of blood). The initial diagnosis was bronchopneumonia. Bronchoscopic investigation revealed a nodule 0.5 cm. in diameter in the region of the carina, partially occluding the right main bronchus; a specimen was removed for study. The bronchopneumonic process responded well to antibiotic treatment, and the patient signed himself out on October 5, before any further definitive therapy could be instituted.

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TABLE 1.—*Distribution of Myoblastoma in 229 Cases**

Site	*Cases*	*Per Cent*
Tongue	78	34.1
Skin	22	9.6
Breast	18	7.9
Subcutis	16	7
Maxilla	16	7
Muscle, excluding tongue	11	4.8
Vocal cord	8	3.5
Thigh	8	3.5
Lips	6	2.6
Buttocks	5	2.2
Mandible	4	1.7
Mouth, excluding tongue	4	1.7
External auditory canal	3	1.3
Trachea and *bronchi*	3	1.3
Vulva	3	1.3
Other sites	24	10.5
Total	229	100.0

*From Murphy, G. H.; Dockerty, M. B., and Broders, A. C., Am. J. Path. 25:1157-1181, 1949.

The biopsy specimen consisted of a reddish fragment of soft tissue measuring 6 by 9 mm. Sections stained with hematoxylin-eosin and para-aminosalicylic acid (according to McManus) revealed a tumor mass just beneath the epithelium of the bronchus. The epithelium of the respiratory tract showed focal squamous metaplasia. The tumor was not encapsulated; it consisted of elongated and polygonal cells with small nuclei and granular cytoplasm. The cytoplasmic granules stained red in the sections treated with PAS, both before and after diastase digestion (Fig. 1). The diagnosis was granular cell myoblastoma of the bronchus.

CASE 2.—A 33-year-old Negro was first admitted to the hospital on June 1, 1951, because of severe cough with occasional hemoptysis for two days, chills, fever and generalized malaise. He had been chronically ill with multiple respiratory difficulties; these were characterized chiefly by a chronic cough of about one and one-half years' duration, with expectoration of at least a cupful of frothy sputum daily.

Physical examination revealed the patient to be well developed and in acute respiratory distress. The blood pressure in millimeters

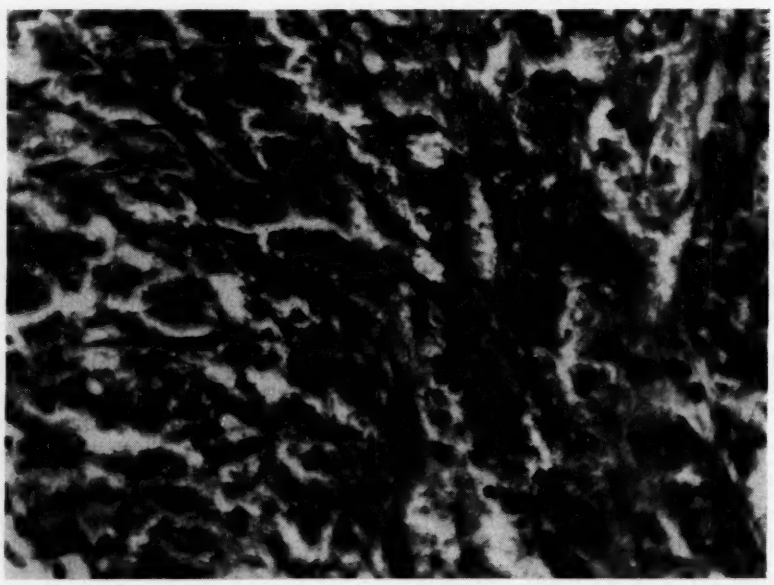

Fig. 1 *(Case 1).*—Polygonal and elongated cells with relatively small, densely stained, nuclei and granular cytoplasm. × 40.

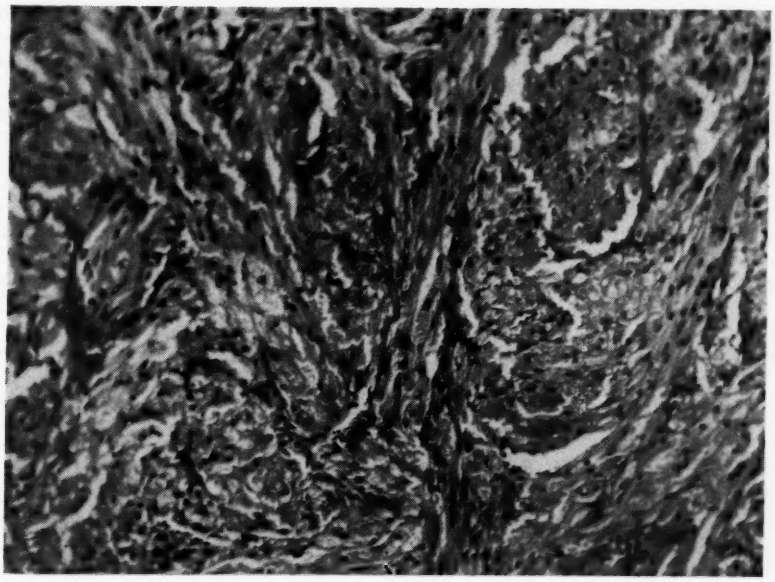

Fig. 2 *(Case 2,* first biopsy, 1951).—Elongated cells with some tendency to form bundles; densely stained nuclei, granular cytoplasm. The appearance of this tumor resembles somewhat that of a neurofibroma; however, the granularity of the cytoplasm of the cells speaks against this diagnosis. × 80.

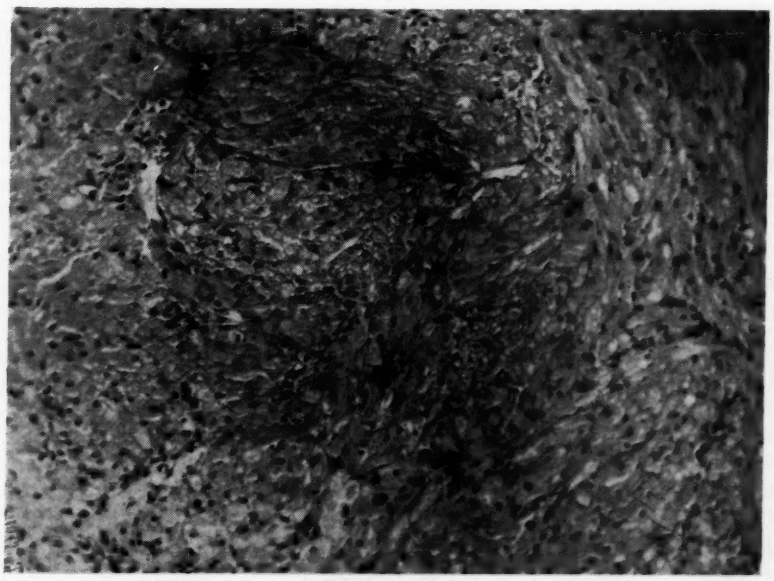

Fig. 3 *(Case 2,* first biopsy, 1957).—Polygonal or moderately elongated cells with densely stained nuclei and granular cytoplasm. × 80.

of mercury was 94 systolic and 50 diastolic; the pulse rate, 132 per minute; the respiratory rate, 22 per minute, and the temperature, 103.6 F. Multiple bilateral rales were noted. Roentgenograms of the chest revealed a mottled density in the apex of the left lung. Laboratory data were essentially normal, with the exception of moderate leukocytosis (12,000 leukocytes per cubic millimeter of blood). Mantoux reactions with 1:1,000 and 1:100 dilution were negative.

A diagnosis of bronchopneumonia was made, and the patient responded to therapy with antibiotics. Only a density in the left hilus remained. Bronchoscopic examination revealed a friable mass overriding the carina and part of the left main bronchus. This mass was removed bronchoscopically. Radiation therapy, with placement of radon seeds into the tumor site, was instituted, and the patient was discharged on July 16.

He was not seen again until April 5, 1957, when he was readmitted to the hospital with complaint of occasional bouts of hemoptysis.

TABLE 2.—*Case Reports from the Literature*

Author	*Age & Sex of Patient*	*Race of Patient*	*Location*	*History*	*Treatment*	*Result*
Frenckner[4] 1938	28 F	W	Post. trachea several cm. below epiglottis	*Dyspnea on exertion;* stridor on expiration, asthma	Endobronchial removal	Asymptomatic 3 years
Kramer[5] 1939	15 F	?	Right lower lobe bronchus	*Productive cough;* fever; clubbing history; roentgenogram of right lower lobe showed pneumonitis	Endobronchial removal	Asymptomatic 5 months
Horn & Stout[6] 1943			No data			
Kraus[7] 1948	48 M	W	Right main bronchus	*Many admissions for chronic pulmonary infarct, right lung,* 10 years: infection of right lung, empyema; lobectomy; bronchopleural fistula	Pneumonectomy, right	Not stated
Liebow[8] 1953	59 M	N	Left upper lobe bronchus	Not stated	Pneumonectomy	Not stated
Lowbeer[9] 1953	24 F	N	Left main bronchus	*Productive cough;* wheezing; atelectasis of left lung	Pneumonectomy	Not stated
Ramsey[10] 1955	18 ?	?	Left main bronchus	Fever; dyspnea; chest pain; repeated pneumonitis, bronchiectasis; roentgenogram showed consolidation of right middle and lower lobes	Endobronchial removal	Reduced size of mass; no long follow-up
Peterson[11] 1957	41 M	W	Right upper lobe bronchus	Fever; chest pain; hemoptysis; asthma	Endobronchial removal	2 years; negative roentgenogram
Peterson[11] 1957	44 M	W	Right lower lobe bronchus	Chronic cough; roentgenogram showed cyst of lung	Segmental resection	Uneventful postoperative course

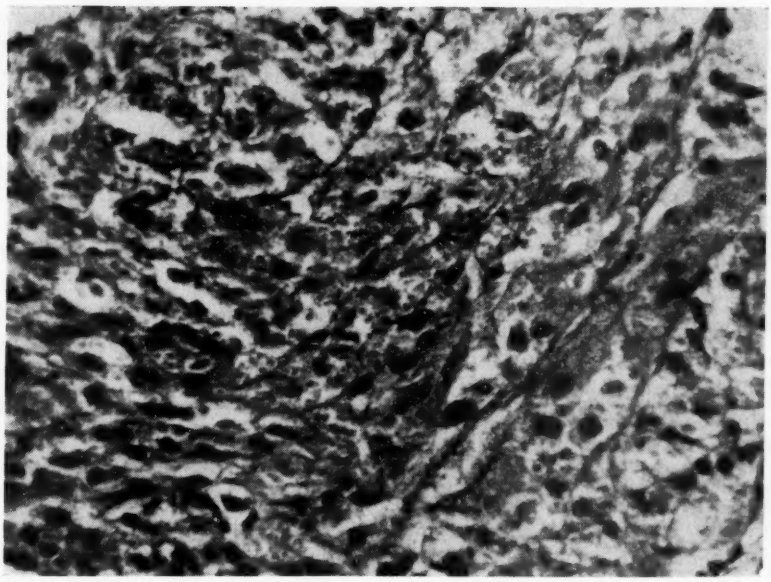

Fig. 4 *(Case 2,* first biopsy, 1957).—Same as Figure 3, under high power; note coarse granularity of cytoplasm.

Bronchoscopic study revealed a friable mass 1.5 cm. in diameter overlying the carina and extending chiefly into the left, but partly into the right, main bronchus.

The biopsy specimen consisted of an irregularly shaped, moderately firm fragment of tissue. Microscopically, beneath the stratified squamous epithelium, there was a small, indistinctly outlined tumor nodule consisting of polygonal, polyhedral or elongated cells with relatively small vesicular nuclei and granular cytoplasm. The sections stained with PAS revealed numerous PAS-positive granules, which could be demonstrated also in sections predigested with diastase. Pathologic diagnosis was granular cell myoblastoma (Figs. 3 and 4).

A second biopsy (Fig. 5), performed about one month later, revealed the same picture. Since the tumor could not be completely removed because of technical difficulties, six radon seeds were implanted. The patient was discharged on June 30.

Review of the original slides from 1951, interpreted at that time as neurofibroma, reveals the following: The tumor was covered by stratified ciliated columnar epithelium. The nonencapsulated tumor consisted of elongated cells with well-defined cellular borderlines and granular cytoplasm. The nuclei were round or elongated. The cytoplasmic granules stained intensely red in the sections treated with PAS, both before and after diastase digestion. After this review of the original slides, the histopathologic diagnosis was granular cell myoblastoma (Fig. 2).

COMMENT

Granular cell myoblastoma is a neoplastic growth. Its morphologic features and biologic behavior are well described in various textbooks and review articles on this subject. Murphy and his associates[2] described the distribution of myoblastoma on the basis of 229 tabulated cases (Table 1). These authors listed the tongue as the most frequent site of occurrence (34.1 per cent); the trachea was listed with an incidence of 1.3 per cent. Table 2 includes the cases of granular cell myoblastoma of

the upper part of the respiratory tract that have been reported in the literature, with tabulation of the clinical symptoms.

The lesion in Case 1, here reported, presented the typical microscopic picture of a granular cell myoblastoma. Case 2 is of greater interest because the tumor was first diagnosed as neurofibroma and because of its recurrence six years after removal.

The term "granular cell myoblastoma," is incorrect because the histogenetic explanation of this tumor given by Fust and Custer[3] is now generally accepted. According to these authors, granular cell myoblastoma originates from the peripheral nerves. If this neurogenic theory is accepted, two possibilities must be considered: (1) origin of the tumor in the fibroblasts (endoneurium) of the peripheral nerves, or (2) origin of the tumor in the Schwann cells, similar to that of neurilemmoma.

The Schwann cells contain a PAS-positive type of cytoplasmic granules, and the same type has been demonstrated in the cells that make up granular cell myoblastoma. On the basis of this fact, we accept the theory that the so called granular cell myoblastoma originates from the Schwann cells of the peripheral nerve. Interestingly, in the first biopsy specimen examined in Case 2, the pattern of interlacing bundles was observed, which explains to some extent the original histologic interpretation.

The peculiar effect of this tumor on the surface epithelium, i.e., the so-called pseudoepitheliomatous hyperplasia of the squamous epithelial lining, has been pointed out in the early treatises on this tumor. In the cases reported here, stratification of the surface epithelium is ascribed to the tumor. Since the squamous cell metaplasia of the bronchus is inter-

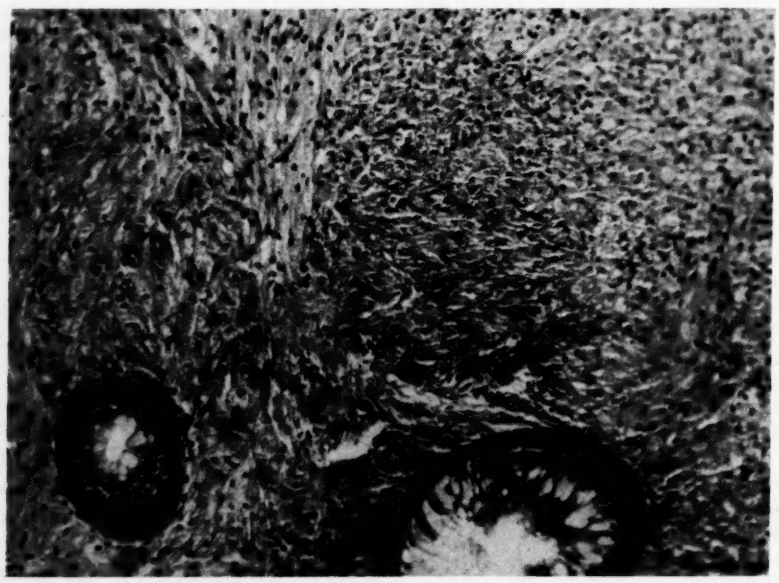

Fig. 5 *(Case 2,* second biopsy, 1957).—Second biopsy shows a certain similarity to first (1951), demonstrating some tendency to bundle formation, which was more pronounced in the first (1951) biopsy (Fig. 2).

preted as a precarcinomatous condition, the question arises whether granular cell myoblastoma, a benign growth, may not become responsible for the development of a bronchogenic carcinoma. This consideration, if definite, would warrant a more radical removal of the tumor.

ZUSAMMENFASSUNG

Es wird über zwei Fälle von "granulärzelligem Myoblastom" des Bronchus berichtet. Ein Überblick über die Literatur bezüglich solcher Geschwülste in dieser Körpergegend wird vorgelegt, und die Histogenese und Bedeutung des Tumors werden erörtert.

RÉSUMÉ

Deux cas de myoblastomes bronchiques à cellules granuleuses sont décrits. La littérature ayant trait à cette localisation de la tumeur est revue; son histogénèse et son importance sont discutées.

RIASSUNTO

Vengono presentati due casi di "mioblastoma a cellule granulose" del bronco. Passatain rassegna la letteratura sull'argomento, viene discussa l'istogenesi e il significato del tumore.

RESUMEN

Se presentan en este trabajo dos casos de "mioblastoma de células granulares" en los bronquios. Se pasa una revisión de la lieratura correspondiente y se discuten la significacion y la histogénesis.

SUMARIO

São apresentados dois casos de "mioblastoma de celulas granulares" dos bronquios. É revista a literatura concernente a êste tumor nesta localização e, discutidas sua histogênese e significação.

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Dreams have been considered as prescriptive in various diseases. Diodorus Siculus relates that a certain Scythian dreamed that Aesculapius had drawn the humours of his body to one place, or head, to have it lanced. When Galen had an inflammation of the diaphragm, we are told that he was directed in a dream to open a vein between the thumb and the fourth finger—an operation which restored him to health. Marcus Antoninus asserted that he learned in his dreams various remedies for spitting of blood. It is related of Sir Christopher Wren, that, when at Paris, in 1671, being disordered with "a pain in his reins," he sent for a physician, who prescribed blood-letting, but he deferred submitting to it, and dreamed that very night that he was in a place where palm-trees grew, and that a woman in a romantic habit offered dates to him. The next day he sent for dates, which cured him. Now, although this cure, brought about by a dream, was considered wonderful, its circumstances offer nothing supernatural. It is more than probable that Sir Christopher had frequently read in foreign works on medicine, that dates were recommended as an efficacious remedy in nephritic complaints; and, moreover, had met in his daily perambulations female quacks, who exhibit themselves to this day in the French metropolis, fantastically attired, and vending their far-famed nostrums. That he should have remembered dates, and that the phantasm of the she-mountebank might at the same time have struck his fancy, were two associations by no means improbable.

It is very likely that all the strange stories of prophetic dreams might be traced to a similar connexion of ideas. I have before observed that dreams do not always assume their complexion from recent occurrences, and our bodily sufferings during sleep bring to our recollection every circumstance that regards the malady. A patient who had a bottle of hot water placed at his feet dreamed that he was walking in great agony in the burning lava of Vesuvius. . . . A case is recorded of an officer who had lost his leg, and, when cold, felt comfort and warmth by wrapping the stump of his wooden leg in flannel.

—*Millingen (circa 1837)*

The Prevention of Sports Injuries

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The author expresses the conviction that most of the athletic injuries occurring in the United States could be prevented by careful supervision and direction on the part of school authorities, especially coaches. If participation in the more strenuous sports were restricted to those students who are thoroughly conditioned physically, and if all competitors were compelled to wear the recommended protective equipment, the incidence of serious injuries could be expected to decrease year by year.

ALTHOUGH the recent Olympic Games in Rome would seem to make a program on sports injuries quite timely, it may be appropriate to note that relatively few injuries are suffered by athletes participating in the Olympic Games. This fact is eloquent testimony in support of the thesis that training and physical conditioning of the finest type offer the best safeguard against sports injuries.

Athletes do suffer physical injuries, and sometimes the injuries are serious. Occasionally an injury received in an athletic contest has been fatal. Voices have been raised protesting against all types of competitive athletics in which there is body contact, such as football, wrestling and boxing. In spite of these objections, a majority of the intelligent citizens of the world recognize the fact that the benefits to the average athlete of participation in various sports far outweigh the risks taken. In this modern world some risks are inevitable even if one never left the threshold of one's own home or attempted to cross a boulevard where cars and trucks are moving. There are risks in everything. The important point would seem to be to recognize the risks for what they are and to take every possible precaution to prevent injuries to the athletes.

The prevention of athletic injuries must be recognized as requiring the cooperation of the coach, the trainer, the team physician and various specialists, working together in one effective unit. In the larger universities in the United States, where the sports program is exceptionally well organized and well planned, more emphasis is placed upon preparing each player, through exercise and training, to prevent injury than is spent in the development of skill at the games to be played. Athletic injuries are becoming less frequent and less severe. In spite of this emphasis upon the prevention of injuries, 10 athletes in the United States died of football injuries in 1955. In 1931, however, when the number participating in the sport was much

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less than in 1955, there were 17 deaths. An ambitious statistician has estimated that a young man or woman driving a car in the United States is taking twelve times the risk of being seriously injured or killed as would be involved in playing football or basketball, or participating in any other type of sports, especially if the athlete is properly conditioned before being permitted to play.

The majority of sports injuries can be prevented. The very young, the inexperienced or the physically nonconditioned candidate should not be allowed to participate in competitive athletic events that include bodily contacts, such as football, basketball, wrestling or boxing. This prohibition should also include any sports that may be dangerous even though it does not involve body contact (e.g., skiing, diving, bicycle racing). The athlete whose skills have been made sharp by training, conditioning and experience will rarely suffer a serious sports injury.

Every would-be participant in sports should be subjected to a careful physical examination before he is permitted to take part in any sports event. This examination should be sufficiently thorough to eliminate the unfit. It should also aid in deciding type of sports each candidate is most likely to be able to engage in with safety. If defects are found during the examination, it may be possible to correct them by appropriate treatment.

Physical examination is especially important during the preadolescent years. Students who have taken part in sports events during high school and have survived them with minimal trauma are less likely to be severely injured during college and in later years than are those whose participation is delayed until they are of college age.

All sports should be supervised by coaches or athletic directors who are experienced in controlling the activities of young athletes or young persons who wish to become athletes. Training, conditioning and improving the skills of any athlete must precede and attend participation in most sports events, if serious injury is to be avoided.

For sports that call for body contacts, such as football, basketball and baseball, protective equipment has been designed. When the sport calls for headgear, shoulder pads, knee pads, baseball batters' helmets, sliding pads, etc., it should be the responsibility of the team manager or coach to insist that the athletes protect themselves, not only for their own benefit but for the good of the sports events themselves. The skillful taping of the ankles, wrists or knees of participants before the engaging in sports events has been a great help in preventing injuries. Many university athletic directors require that every football player must have his ankles taped or wrapped. The Louisiana wrap, popularized at the University of Louisiana, where great football teams have been developed, is carried out with a strap of webbing 100 inches long. This adds tremendously to the strength of the ligaments and bones in the region of the ankle. The wrapping of every ankle is required for football players at the University of Oklahoma, where national championship teams have been developed in each of several recent years. Dr. D. F. Hanley of Bowdoin College stated: "We have not lost a man for a game (football) in five years who has worn his ankle wraps correctly. The young athlete who feels encumbered by the pads or strappings of various joints and refuses to wear them is very likely to be lost to a team for an entire sports season because of injuries which might have been avoided."

To recapitulate, the items discussed may be listed as a set of precepts for those in charge of athletics:

1. Do not permit (a) the very young,

(b) the inexperienced or (c) the physically nonconditioned to participate in athletic events such as football, wrestling, boxing, skiing, etc.

2. Require a careful physical examination, especially for the preadolescent.

3. Insist upon supervision by good coaches and athletic directors.

4. Make training and conditioning essential as prerequisites.

5. Provide protective equipment and see that it is used.

6. Tape or strap ankles, knees and wrists; this will prevent many injuries.

ZUSAMMENFASSUNG

Der Verfasser ist überzeugt, dass die meisten in den Vereinigten Staaten vorkommenden Sportverletzungen vermieden werden könnten, wenn die Schulbehörden, besonders die Sportlehrer, die Sporttätigkeit sorgfältig leiten und überwachen würden. Wenn nur körperlich geeigneten Schülern die Teilnahme an anstrengenderen Sportsaktivitäten gestattet wird, und wenn das Tragen von Schutzvorrichtungen, die für bestimmte Sportarten empfohlen werden, erzwungen wird, dürfte sich die Häufigkeit des Vorkommens ernster Verletzungen von Jahr zu Jahr vermindern.

RÉSUMÉ

L'auteur est convaincu que la plupart des lésions sportives observées aux Etats-Unis pourraient être évitées si les autorités scolaires, et en particulier les entraîneurs, exerçaient une surveillance attentive et directe sur les activités sportives. Si seuls les jeunes gens physiquement tout à fait aptes étaient autorisés à pratiquer les sports les plus violents et s'ils étaient obligés au port de l'équipement protecteur recommandé pour les athlètes dans certains sports de compétition, l'on pourrait s'attendre à une diminution annuelle notable des lésions sportives graves.

RIASSUNTO

L'autore è persuaso che molte delle lesioni che si verificano negli sportivi negli Stati Unitipotrebbero essere evitate se le autorità scolastiche si occupassero direttamente della sorveglianza delle attività sportive. Se si consentisse di affrontare gli sport più violenti soltanto a qugli individui che possiedono la necessaria struttura atletica e se li si obbligasse a indossare i mezzzi protettivi stabiliti per ogni singolo sport, la frequenza di lesioni gravi diminuirebbe anno per anno.

RESUMEN

El autor está convencido de que la mayor parte de los traumatismos del deporte que se producen em Estados Unidos poían evitarse si las autoridades de los colegios, y sobre todo los entrenadores, dirigiesen y vigilasen con interés las actividades deportivas del centro. Si para la práctica de los deportes que exigen mucha violencia se admitiese solamente a los sujetos que reúnan condiciones físicas adecuadas, y se obligase al empleo de objetos de protección propios de dicho deporte, serían muchos menos los traumatismos que iban a producirse.

SUMARIO

O Autor está convencido de que a maioria de traumas atléticos que ocorrem nos Estados Unidos da América do Norte poderiam ser evitados se as autoridades escolares, e especialmente os treinadores supervisassem cuidadosamente e dirigissem as atividades esportivas. A incidencia de acidentes sérios decrescerá âno a âno se sómente àqueles perfeitamente preparados fisicamente por permitido tomarem parte nos esportes mais extenuantes e serem obrigados a usar equipamento protetor recomendado para atletas em esportes nos tipos em que estiverem competindo.

Basic Philosophy, Principles and Objectives in Total Rehabilitation

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PHYSICAL medicine and rehabilitation are parts of the total care of the patient and, when properly utilized, important factors in conserving man's usefulness and the nation's manpower.

The joint designation "physical medicine and rehabilitation" includes the diagnosis, management and treatment of disease, defect or injury by the use of physical means and the restoration of the patient to the fullest possible physical, mental, social, vocational and economic usefulness. The Physical Medicine and Rehabilitation Service, as established in the Veterans Administration, consists of the Physiatrist (physician specialist in physical medicine and rehabilitation), the Rehabilitation Coordinator, the Physical Therapist, the Corrective Therapist, the Speech Therapist and the Blind Rehabilitation Therapist. The Armed Forces and some civilian rehabilitation institutions have somewhat similar organizations.

Physical medicine and rehabilitation, properly integrated with all available medical and other professional services, can reduce to a minimum the handicaps associated with disability. Complete coordination of the Physical Medicine and Rehabilitation Service with the Medical, Surgical, Psychiatric, Psychological, Vocational Rehabilitation, Nursing, Dietetic, Social Work and other available services is vital. One should know about other services, agencies and institutions that can be consulted for aid in this tremendous task of caring for the sick. The amputee; patients with hemiplegia, paraplegia or quadriplegia; patients with peripheral nerve involvement; peripheral vascular disorders and orthopedic disabilities; patients with thoracic surgical conditions; patients who undergo plastic surgical operations; patients with burns; patients with cardiac and rheumatic disease, as well as patients with many other types of medical and mental illness, can benefit from a well-planned program of physical medicine and rehabilitation.

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Basic and clinical research, hand in hand with the highest quality of medical care, will enrich the field of preventive medicine as well as the broad field of treatment. All rehabilitative procedures must be instituted early, adequately and for a sufficient period to secure maximum function with minimum disability. Through total rehabilitation, many disabled persons can be returned to the community as useful, productive members with a satisfactory measure of independence and happiness. This is not only economically sound; it is a moral obligation.

The immediate goal is to save lives, but the long-range objective is to return the sick to useful living. There must, however, be a realistic awareness and understanding, on the part of all who deal with the sick, as to the goals that can be reached. Miracles cannot be performed.

With the rise in the incidence of disease and injury associated with increasing lifespan and the ever increasing number of accidents associated with industry, domestic life and the various means of transportation, plans must be quickly formulated for increasing the number of trained personnel as well as the availability of adequate facilities to meet the tremendous challenge of total rehabilitation. Certain basic general principles are applicable in the approach to its complex problems. All patients have, to a certain degree, psychic and emotional problems associated not only with their illness but with their hospitalization. Injudicious restriction of activity and the boredom associated with the slow passage of time during one's illness, are irritating and frustrating; they hamper motivation. One must remember that frequently, in addition to orientation of the patient to the proposed program of therapy, his family must be equally oriented, so that after maximum benefits have been accomplished the problems associated with disposition will be minimized. One must attempt to develop motivation in the patient and a keen desire to "get well," for only in this way can his maximum cooperation be insured.

The overall medical picture governs the type, rate, number and extent of rehabilitative procedures. There are no routines. The activity program must be individualized to meet the specific physical and mental needs of the patient. Self-care and daily living activities, including ambulation, should be encouraged. His ability to perform the maximum number of the activities associated with eating, communication, hygiene, dressing, locomotion and household functions enhances motivation and at the same time brings the patient closer to his goal of usefulness. It must be stressed that with some patients many self-care activities are beyond the realm of accomplishment. When indicated, proper selection and training in the use of such devices as splints, crutches, braces, canes, artificial extremities, wheel chairs, etc., must be part of the program. For those who cannot return to their former type of occupation due to their disability, realistic vocational rehabilitation should be initiated early in the program. Many persons, especially among the elderly, may not be employable but can be rehabilitated to the point of independent living, and in many instances, with minimal assistance, to self-care.

Physical medicine and rehabilitation can be considered as consisting of three phases that overlap to a degree but have continuity; medically prescribed preventive rehabilitation, definitive rehabilitation and maintenance rehabilitation.

Preventive Rehabilitation: This consists of procedures instituted early, even though the patient is unconscious; for example, after an accident or a "stroke." Proper positioning in bed, the use of splints and movements of the extremities in order to prevent contractures and deformities, delayed deconditioning and aid to circulation should be parts of the program.

Definitive Rehabilitation: Specifically prescribed rehabilitation procedures are instituted to improve general muscle tone and strength, as well as function, for the performance of the greatest possible number of self-care activities. It is never necessary to withhold therapy until the patient can be taken out of his bed, for treatment can be given at the bedside. When illness strikes, the patient always shows a measure of anxiety, ap-

prehension and fear. Entering a hospital or other institution may be a frightening or even a horrifying experience for some. An active program with proper orientation, however, will help in alleviating these reactions.

Maintenance Rehabilitation: Therapeutic procedures are continued even after discharge from the hospital or transfer to another institution, nursing home or the patient's own home, so that he can at least maintain his accomplishments and not regress. In the presence of certain progressive disorders the continuation of maintenance activities by the patient is frequently impossible.

A program of total rehabilitation should be progressive, starting with the stage of acute illness or injury and proceeding to a vocational goal or one of independent living. This does not necessarily mean that the patient must remain in a hospital for acute conditions; he can progress to a rehabilitation ward or center and then on to his home, nursing home, foster home or other satisfactory living situation.

In addition to the many therapeutic procedures, numerous diagnostic procedures are available, such as electrodiagnostic tests, including electromyography; electrical skin resistance tests; sweating pattern tests; oscillometric evaluations; and tests of muscle strength and range of joint motion, among others.

Through adequate vocational rehabilitation, including counseling, training and selective "job placement," many disabled persons can be returned to useful pursuits with a minimal handicap or, perhaps, none. In this manner, even though the disability exists, the handicap in performing a specific task is minimized and in many instances does not exist. The words "disability" and "handicap," therefore, must not be confused or used interchangeably. It is well to remember that when a disabled person is properly placed vocationally, there is a beneficial effect on his mind and body as well as on his family's morale and well-being. All these favorably influencing factors lead to a lower incidence of readmission to the hospital. Those who deal with the sick must have a continual realistic awareness of the rehabilitation needs of the patient. Not all disabled persons will walk again, and not all will be employable, yet the objective should be the maximum possible measure of independent living.

RÉSUMÉ

La recherche fondamentale et clinique, liée à des soins médicaux éclairés, permettront d'élargir le champ de la médecine préventive de même que le vaste domaine de la thérapeutique. Toutes les techniques de réhabilitation sont à instituer précocément et doivent s'étendre sur une période suffisamment longue pour assurer une fonction maximum avec un minimum d'incapacité. Grâce à une réhabilitation totale de nombreux invalides peuvent reprendre une place utile dans la communaté dont ils redeviennent des sujets productifs. Il ne s'agit pas seulement là d'une obligation morale, mais aussi de la santé économique d'un pays.

RIASSUNTO

La completezza delle ricerche cliniche e la perfezione delle cure mediche possono assicurar il progresso della medicina preventiva anche nel vasto campo della terapia. Tutti i metodi di riabilitazione debbono essere istituiti precocemente, in maniera adeguata e per periodi sufficientemente lunghi da garantire il massimo della ripresa funzionale e il minimo di invalidità residua. Attraverso la completa riabilitazione molti invalidi potranno tornare alla vita sociale come membri utili e produttivi e con la soddisfazione che deriva dalla indipendenza.

ZUSAMMENFASSUNG

Fundamentale und klinische Forschung wird gemeinsam mit dem Streben nach dem höchsten Grade ärztlicher Versorgung dazu führen, dass die vorbeugende Medizin und das weite Gebiet der Behandlung körperlich Behinderter an Umfang und Bedeutung gewinnt. Um den höchsten Grad von Funktionstüchtigkeit und ein Minimum an Arbeitsunfähigkeit zu gewährleisten, ist es nötig, alle Massnahmen zur Wiederherstellung frühzeitig einzuleiten und in ausreichendem Masse und genügend lange durchzuführen. Durch völlige Rehabilitierung gelingt es, viele beschädigte Personen als nützliche und produktive Mitglieder in die Gemeinschaft zurückzuführen und ihnen das Gefühl der Unabhängigkeit und Zufriedenheit zu geben. Damit wird nicht nur eine moralische Verpflichtung erfüllt, sondern auch ein vernünftiger ökonomischer Schritt getan.

RESUMEN

La investigación ciaentífica y clínica junta con una categoría elevada en la práctica médica han de mejorar el campo de la medicina preventiva así como las posibilidades del tratamiento. Con objeto de asegurar una recuperación funcional máxima y para prevenir las incapacidades las técnicas de rehabilitación deben aplicarse precozcente y durante el tiempo necesario. Por medio de la rehabilitación integral muchos incapacitados pueden ser devueltos a la comunidad como miembros activos dotados de las suficientes independencia y felicidad. Esto no solamente constituye una obligación moral sino que también constituye un beneficio económico.

SUMARIO

Pesquisas clinicas e basicas associadas com cuidados médicos da mais alta qualidade, fortificarão o campo da Medicina Preventiva, assim como o amplo âmbito de tratamento. Todos os procéssos de re-habilitação devem ser instituidos precocemente, adequadamente e por periodo de tempo suficente, de modo a assegurar o máximo de função com o minimo de incapacidade. Através de re-habilitação (reabilitação) total, muitos incapazes podem ser devolvidos a comunidade, como membros produtivos e sensações satisfatórias de independencia e felicidade. Não se trata aqui, sómente, de uma obrigação moral mas de alto interêsse econômico.

SUMARIO

Pesquisas básicas e clinicas e a melhor qualidade de cuidados médicos assegurará progresso no campo da medicina preventiva assim como no vasto terreno do tratamento. Todas as medidas de reabilitação devem ser instituidas precocemente, adequadamente e por um periodo suficiente de modo a prover maxima função com o minimo de incapacidade residual. Através de reabilitação total muitos incapazes podem retornar à comunidade, com membros produtivos e uteis com satisfatórios gráus de independencia e felicidade.

They make a desolation and they call it peace.

—*Tacitus*

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Sección en Español

Trombosis por Esfuerzo del Miembro Superior o Trombosis Primaria Subclavioaxilar por los Dres

(Thrombosis Due to Strain of the Upper Extremity or Primary Subclavicular Stress Thrombosis)

VICENTE F. PATARO, M.D., F.I.C.S., y MANUEL A. CASAL, M.D.

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Seven cases of thrombosis of the upper extremity are reported, and the authors discuss the problem from the etiologic, symptomatic, diagnostic, pathologic and therapeutic points of view. The results of clinical studies are described in detail. The observations of other investigators, as recorded in the literature, are considered and compared with the authors' own.

EN el miembro superior se presentan, con una frecuencia mayor de lo que habitualmente se supone, cuadros tromboflebíticos que se caracterizan por su espontánea y súbita aparición y por su benigna evolucion. Se trata de trombosis de la vena axilar qué, en su propagacion proximal, alcanzan la vena subclavia. Otras veces, las menos, su localizacion es particularmente subclavia.

Estas trombosis, de las venas axilar y subclavia, son primarias, idiopáticas o esenciales y no se observan con tanta frecuencia como las de los miembros inferiores, sin embargo, distan de ser raras o excepcionales. Súrgen subitamente en personas que gozan de buena salud, generalmente, jóvenes y fuertes, quienes, con sorpresa, advierten que uno de sus miembros superiores—la mayoria de las veces, el derecho—se ha hinchado, duele y está cianótico.

Del estudio del cuadro patológico de estas trombosis primarias, vinculadas casi siempre a un esfuerzo realizado por el miembro afectado, excluiremos a todas las trombosis secundarias a procesos infecciosos, trombógenos, a las vinculadas con traumatismos directos, con o sin fracturas, a las que aparecen en la evolucion de un cáncer mamario, mediastínico, etc., y las que complican una asistolia grave.

El esfuerzo—o traumatismo indirecto—figura siempre entre los antecedentes de este sindrome—o por lo menos casi siem-

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pre—ya sea atenuado o violento, único o reiterado, lo cuál justifica la denominación con que se la distingue "trombosis por esfuerzo" y que proviene de la escuela alemana.

Este sindrome tambien ha sido denominado "edema agudo o sub-agudo del miembro superior" por la escuela francesa y "sindrome de Paget-Schroetter," en mérito a los dos autores que a fines del siglo pasado describieron, por primera vez, sus características clinicopatológicas. Los autores que niegan la existencia de la trombosis venosa, en todos los casos, la denominan "claudicación intermitente" (Loehr[1]) y "espasmo venoso traumático" —Mac Carthy.[2]

Historicamente le corresponde a Sir James Paget,[3] el mérito de haber descripto este sindrome antes que nadie lo hiciera; en efecto, en 1875, en sus lecciones de clínica quirúrgica comunicó dos observaciones de flebitis del miembro superior, cuya etiologia no pudo precisar, pero cuya descripción clínica se ajusta al sindrome que hoy conocemos como de "trombosis por esfuerzo del miembro superior." Poco tiempo despues, en 1884, von Schroetter,[4] en Alemania, describe un cuadro con trombosis axilar y señala, por primera vez, la vinculación que existía entre el cuadro clínico y un esfuerzo muscular realizado poco tiempo antes por su paciente. Por este motivo, Olivier y Leger,[5] han afirmado, con toda justicia, que la trombosis por esfuerzo del miembro superior ha nacido ese dia gracias a la observacion de von Schroetter.

Y tambien por esa descripción de von Schroetter, pudo Ceni,[5] en 1906, al observar una trombosis del miembro superior, consecutiva a ejercicios violentos, diagnosticar sin titubear: "trombosis traumática de la vena axilar."

A partir de esas fechas son numerosas las publicaciones sobre el tema. En 1949, Hughes,[6] recopila 320 casos publicados. Y, en 1955, Pfleuger,[7] nos informa que suman 410 los sindromes por esfuerzo del miembro superior publicados en todo el mundo (cuadro 1).

En nuestro pais las primeras observaciones pertenecen a Chutro,[8] en 1914 y 1915, a Pavlovsky,[9] en 1920, y a Ivanissevich,[10] en 1922.

CUADRO 1 *(Adaptado de Pfleuger[7]).—Datos clínicos en 410 casos de obliteracion de las venas subclavias y axilares*

Edad	Menores de 18 años	4.5%
	18-40 años	71.8%
	más de 40 años	23.7%
Sexo	Masculino	74.5%
	Femenino	25.5%
Lado	Derecho	66.4%
	Izquierdo	33.6%
	Ambos lados	2.4%
Síntomas iniciales	Dolor	34%
	Edema	57%
	Enrojecimiento	6%
	Dolor agudo	2%
Comienzo	Repentino (horas)	29.7%
	Gradual (días o semanas)	48.8%

CASUISTICA PERSONAL

CASO 1 (clientela privada, 1945).—B. L. de 42 años,h,profesional. Sano y sin antecedentes. Hace 2 semanas, trabajando en su quinta, cavando y arreglando plantas, realiza algunos esfuerzos musculares. Al dia siguiente, edema y dolor en todo el miembro superior izquierdo. Le indican tratamiento anticoagulante, que no realiza; solamente, analgésicos y reposo. Consulta a otro colega, quién, previa flebografía, aconseja exploración quirúrgica que el paciente no acepta. La flebografia (Fig. 1*A*), es característica de trombosis subclavioaxilar.

Estado actual: Paciente de buena constitucion física, preocupado por su enfermedad. Discreto edema en todo el miembro superior izquierdo, cianosis apenas reconocible; no hay cordón venoso axilar. Circulación colateral en el hombro muy evidente.

Tratamiento: Vendaje elástico, drenaje postural, analgésicos y sedantes. Un més despues el cuadro sintomatólogico ha desaparecido, quedando solamente la circulación colateral.

CASO 2 (clientela privada, 1950).—J. R. de 39 años,h,empleado. Sano y sin antecedentes. Por ser empleado de una zapateria tiene que

bajar y subir cajas de zapatos, habitualmente, con sus brazos por encima de su cabeza. Hace una semana, bruscamente, nota dolor en el brazo y hueco axilar izquierdo; inmediatamente, edema, que se extiende por todo el miembro. Ademas, congestión y aumento de la temperatura local. Atendido por nosotros de la forma siguiente.

Estado actual: Edema en todo el miembro, cianosis y marcada circulación colateral a nivel del hombro y axila. Se palpa, en la axila, un cordón doloroso que sigue el trayecto de los vasos axilares. Se efectúa la correspondiente flebografía que es muy típica (Fig. 1*B*). Tratamiento: Drenaje postural, vendaje elástico compresivo. Bloqueo del ganglio estrellado, que se repite dos veces.

A los 15 dias, los síntomas desaparecen. No hemos vuelto a ver al paciente.

CASO 3.—Incluimos el presente caso, aunque no se trata de una trombosis primaria subclavioaxilar, por las ilustrativas flebografias. 6-VI-1939. Paciente A. A. de 50 años,h,empleado. Gentileza del Prof. A. Quereillac. Trombosis subclavioaxilar correspondiente a la compresión ejercída por un tumor a nivel del confluente de Pirogoff (lado izquierdo, Fig. 2*A*). La Figura 2*B* muestra la flebografía del trayecto venoso del lado derecho que está normal, en el mismo enfermo.

CASO 4 (Hospital Rawson, Jan. 11, 1957).—L. de P. de 35 años,m,casada,arg. El 1-11-57 nota, bruscamente, en horas de la siesta, que el miembro superior derecho duele y aumenta de tamaño.

Esta paciente no tiene ninguna actividad especial, ni como dueña de casa, ni profesional, solamente refiere que, 4 dias antes, estuvo lavando, con el miembro superior elevado, las banderolas de su cuarto de baño.

Estado actual. Mujer de excelente contextura física. Nada de particular en su exámen general. En el miembro superior derecho llama la atencion el edema global del mismo, congestión acentuada que se extiende desde la mano hasta la region deltoidea. Circulación venosa marcada en antebrazo y brazo, circulación colateral venosa en el muñon del hombro. A la palpación de los músculos, dolor.

Tratamiento. 6-11-57: bloqueos del ganglio estrellado en 4 sesiones. Fenilbutazona, vendaje elástico, drenaje postural. A la semana hay una evidente mejoría; el edema, practicamente, ha desaparecido.

Radiografías de tórax y hombro, sin particularidades.

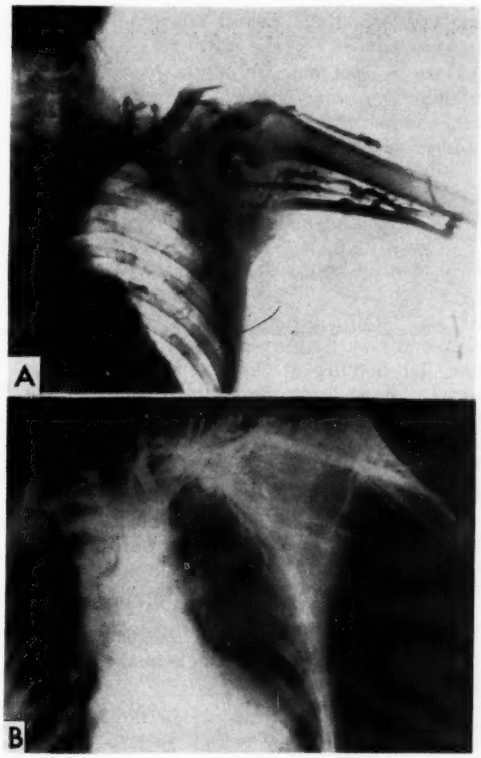

Fig. 1.

Continúa, una semana más, con fenilbutazona. El 26-11-57 no concurre más a visitarnos.

Nueve meses después, inopinadamente, nueva "pousee" aguda; dolor, edema, circulación venosa colateral, muy marcada, en hombro y brazo derechos.

Se repite el mismo tratamiento. 10 dias despues, notable mejoría. Los pulsos siempre fueron normales.

Vuelve a consultarnos el 23-1-58 con un nuevo episodio, relatando que, 2 semanas antes, tuvo otro. El edema del miembro es tan marcado que a nivel de la mano no puede doblar los dedos. Intenso dolor en el hombro y nuca.

Se le efectúa la flebografía que muestra la Figura 3*A*.

Se le instituye tratamiento sintomático y se le propone una exploración quirúrgica que no acepta. Continúa con tratamiento médico y A.M.P.5.

CASO 5 (Clientela part., 1953).—J. F. L. de 20 años,h,solt.,arg. Siempre ha sido sano. Prac-

tica esgrima desde hace 3 años. Actualmente está haciendo el servicio militar.

Hace 4 días nota, repentinamente, que el miembro superior derecho aumenta de volumen, toma un color rosado acentuado, disminuye de temperatura, pero no tiene dolor.

Estado actual: Jóven de aspecto vigoroso, de 1,79 m. de estatura y 70 K. de peso. Su exámen general no acusa ninguna alteración.

Miembro superior derecho: Aumento global de volumen. Tinte cianótico generalizado en todo el miembro—desde los dedos hasta el hombro.—Circulación venosa marcada en todo el miembro y muy exagerada a nivel del muñon del hombro y cara antero-superior del tórax. Mano fria. En axila se palpa un cordon indurado y doloroso que sigue el trayecto de los vasos axilares. La fuerza conservada. Radiografía del tórax, normal. Tratamiento. Drenaje postural. Vendaje elástico.

El 25-VII-53, esta muy mejorado; cianosis disminuida, edema disminuido. La circulación colateral ha quedado circunscrita a la cara anterointerna del brazo y parte superior del tórax.

Continúa con tratamiento medico. Un mes despues curado. Alta. Ha dejado de practicar esgrima.

CASO 6 (Clientela part., 1953).—B. E. de 39 años,h,solt.español. Siempre fue sano. Refiere que hace 4 días, sin ningun dolor, nota edema marcado en todo el miembro superior derecho con intensa congestión y pesadez.

Como antecendente, el paciente refiere que desde hace 4 meses viene notando que la mano derecha se pone cianótica en forma periódica. Estado actual. Sujeto sano y vigoroso. Exámen general, normal. Miembro superior derecho. Edema franco en brazo. Cianosis marcada en cara anteroiterna del brazo. Gran circulación colateral en hombro y brazo. Tratamiento. Infiltración anestesica del ganglio estrellado (tres sesiones) con excelente resultado. Vendaje elástico. Drenaje postural.

Resultado alejado, curación. Solamente queda circulación colateral en hombro y cara anterosuperior de tórax.

CASO 7 (Policlinico Avellaneda Servicio de Clin.Quirurg., 1957).—A. G. de 28 años,h,solt., arg., albañil. Al realizar sus habituales tares de albañil siente, subitamente, dolor en brazo y codo derechos que le imposibilitan para seguir trabajando.

Estado actual. Al dia siguiente de haber tenido el dolor, el paciente presenta intensa congestión cianotica desde los dedos hasta el codo,

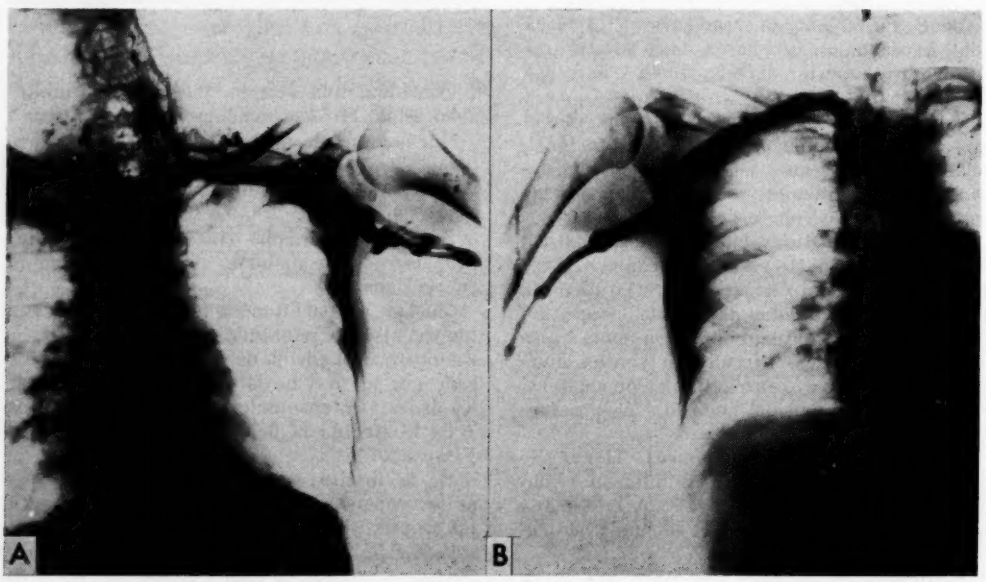

Fig. 2.

discreto edema en brazo y hombro. Circulación colateral en hombro y region deltoidea. La temperatura del miembro y los pulsos son normales. Tratamiento. Infiltración del ganglio estrellado. Vendaje elástico y drenaje postural. Se repiten las infiltraciones del estrellado con evidente mejoría del dolor y edema.

El 27-IX-1957, muy mejorado. Ha desaparecido casi totalmente el edema. El 8-X-1957, de alta, con ligera circulación colateral; vuelve a trabajar.

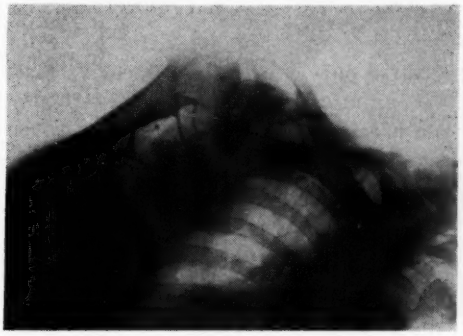

Fig. 3.

CONSIDERACIONES

Estudio Clínico.—Edad: Puede presentarse en cualquier edad, pero la mayoria de las veces afecta a personas jóvenes, con buen estado de salud; generalmente robustos. La mayor incidencia se registra entre los 20 y 30 años.

Sexo: Predomina el sexo masculino—75%.—En nuestros 7 casos, sólo hubo 1 mujer.

Lado: Se comprueba en el lado derecho en un 66%. Cuando se localiza en el miembro izquierdo es porque ese lado ha sido utilizado en forma desacostumbrada o porque el paciente era zurdo. En nuestra estadistica se registraron 5 trombosis derechas y 2 izquierdas.

Profesión: Cualquier profesión puede comprobarse. Sin embargo, los casos relatados en la bibliografía mundial indican una evidente vinculación entre las trombosis subclavioaxilares por esfuerzo y los movimientos efectuados por los pacientes en ciertas profesiones, oficios o deportes. En nuestros casos podemos señalar lo siguiente: en el caso n° 1 el paciente estaba trabajando con una pala en su quinta; en el caso n° 2, era un empleado que constantemente tenia que levantar cajas de zapatos por encima de su cabeza para colocarlas en los estantes; en el caso n° 4, habia desarrollado tareas domesticas con sus miembros superiores en forma desacostumbrada; en el caso n° 5, comprobamos que se trataba de un esgrimista; en el caso n° 7, se trataba de un albañil.

Síntomas y Signos: El edema y el dolor son los síntomas que, solos o asociados, están presentes, practicamente, en todos los casos.

El *dolor*, generalmente, inicia el cuadro clínico; su intensidad, localización, duracion y modalidad son variables. Con frecuencia es agudo, como un latigazo a nivel del hombro y de la axila. Este dolor puede presentarse inmediatamente despues de haber realizado, el paciente, un esfuerzo—abducción forzada—o, con algunas horas de intervalo; no es raro que se presente al levantarse por la mañana.

Su propagación puede ser braquial, clavicular o cervical; otras veces queda limitado al sector axilar. Con menor frecuencia se extiende al antebrazo y mano.

Su duración es, generalmente, breve. No es dificil comprobar que desaparece cuando se instala el edema. La duración de esto dolor preedematoso puede ser de horas o dias. Olivier y Leger[5] refieren un caso con tres meses de duración.

Aunque no es lo comun, puede faltar, como ocurrio en dos observaciones nuestras (Casos n° 5 y 6).

El *edema* es el síntoma mas frecuente y puede aparecer, aún, sin dolor previo. Su localización es hombro-brazo y puede extenderse a todo el miembro y, tambien, al cuello, borrando los huecos sub y supraclavicular.

El período de tiempo existente entre el esfuerzo y la aparición del edema no puede precisarse pués es variable; pueden transcurrir minutos, horas o dias. Tampoco puede precisarse su duración, aunque hay que convenir que, exceptuando a la circulación colateral, es el síntoma que mas tardiamente desaparece.

Este edema es firme, tenso, elástico, no deja "godet," y se acompaña de una coloración cianótica.

Generalmente el miembro edematoso mide, circunferencialmente, de 1 a 8 cm. más que el miembro sano.

La *circulación colateral* es de muy frecuente comprobación; indica buen pronóstico pues tiene una funcion compesatoria.

En la raiz del miembro y en la pared torácica superior se puede observar una red de venas azuladas que ponen en vinculación a las venas basílica y cefálica con las venas del cuello y del tórax.

Según Sampson, Saunders y Capp,[11] existen 4 grupos de venas colaterales a) un grupo superior que desde la vena cefalica, pasando por encima de la clavícula, alcanzan a la vena yugular externa; este grupo venoso tambien puede vincularse a la vena basílica, b) un segundo grupo, que rodeando al pezon, se extiende, desde la vena mamaria interna a la vena basílica, c) un tercer grupo que une las venas intercostales, mamaria interna, yugular externa y vena cefálica. Este grupo puede anastomosarse con las venas del otro hemitórax, d) un cuarto y último grupo que anastomosa las venas axilar y basílica con las venas epigástrica e intercostales inferiores a través de la vena mamaria externa.

El *cordon venoso axilar palpable* no es de comprobación frecuente. Cuando ello ocurre, se palpa, en el hueco axilar y en el trayecto axilo-humeral, un cordon duro, doloroso o sensible del tamaño—diámetro —de un lápiz o de un dedo índice.

A veces, se extiende a las venas basílica y cefálica; Olivier y Leger[5] han comunicado casos en los cuales se extendía hacia la vena yugular externa.

Con frecuencia, el cordon venoso axilar se acompaña de una discreta tumefacción de los tejidos blandos perivenosos del hueco de la axila. En nuestros casos 2 y 5, comprobamos el cordon doloroso axilar.

La *cianosis* puede ser total o parcial—en relación al miembro. Es un signo muy frecuente. Puede adoptar tonalidades lívidas, rojizas o rojoazuladas.

La *impotencia muscular, pesadez y torpeza del mienbro,* como consecuencia del dolor y del edema, es de frecuente comprobación. Puede ser de mayor o menor intensidad; y, a veces, después de la curación del proceso, suele quedar una ligera pesadez o torpeza durante varios meses.

Las *parestesias, las equimosis, las adenopatías axilares* y los cambios de temperatura del miembro son de escasa observación.

La *presión venosa* está aumentada en el lado enfermo; en el descanso es menor, pero, con los movimientos, puede llegar hasta la cifra de 300 mm. de agua, según Ollinger,[12] Balas [13] y Drewes.[14]

La cantidad de oxigeno en la sangre venosa es menor en el lado trombosado—Veal y McFetridge[15]—en el mismo sentido opina Horton,[16] quien nos informa que en el lado afectado hay 43 Vol. % contra 70 Vol. % del lado sano.

El tiempo de protrombina es normal (Wanke[17]).

La fiebre es de escasa comprobación, y, ouando existe no pasa de los 38°. En términos generales podemos afirmar que este sindrome no tiene, la mayoría de las veces, repercusión general.

Diagnóstico: El diagnóstico surge de la vinculación de un esfuerzo con la súbita aparicion del dolor, edema, cianosis y circulación colateral en un paciente jóven, robusto y sano hasta ese momento.

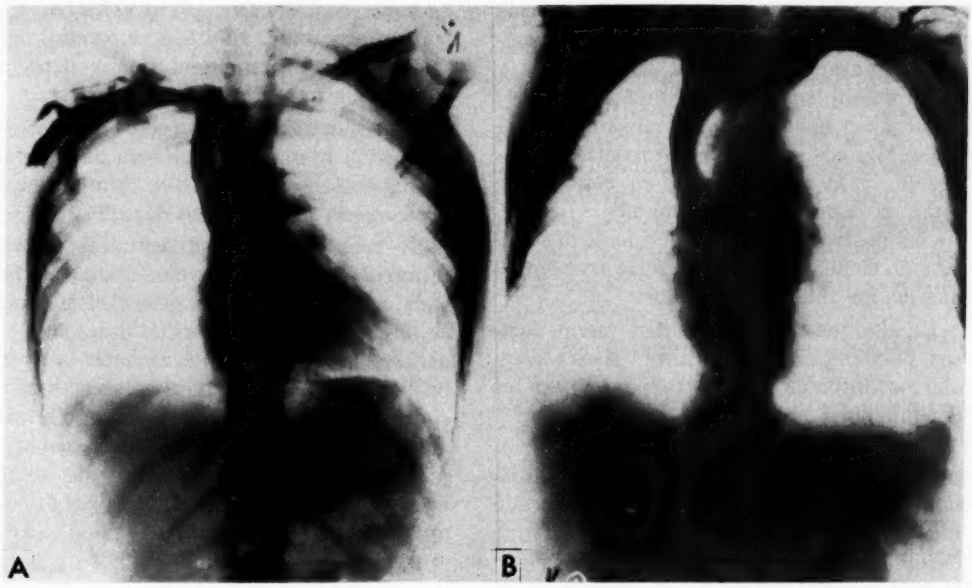

Fig. 4.

Naturalmente que hay que descartar todo factor de orden general, infeccioso o sanguineo, que pueda producir tromboflebitis con localizacio subclavio axilar.

De la misma forma a través de un cuidadoso estudio clínico y radiológico habrá que despistar cualquier proceso tumoral en el mediastino, mama, cuello o axila que por compresion produzca edema del miembro superior, con o sin trombosis.

Además de las neoplasias y de los aneurismas pueden confundir el diagnostico los edemas alergicos o nerviosos—siringomielia.

El edema elefantiásico del miembro superior es excepcional (Olivier y Leger[5]).

Tambien deben excluirse las trombosis axilares por traumatismo directo, fráctura, foco séptico vecino, etc.

Igualmente las trombosis que se desarrollan en el transcurso de una asistolia.

En las trombosis por esfuerzo del miembro superior tiene valor diagnóstico la flebografía. La flebografía indica el lugar del *stop* y la evidencia de una profusa red colateral (Figs. 1, *A* y *B*, 2*A* y 3*B*). Tiene importancia la ejecución técnica de la flebografía, lugar de inyección, cantidad de la sustancia de contraste, la presión y si las imájenes han sido obtenidas en serie o aisladas. Presentamos a la consideracion de los lectores dos imajenes normales del tronco venoso subclavioaxilar, derecho e izquierdo, respectivamente (Figs. 3*B* y 4), para que puedan comprobar la diferencia con las flebografías de los pacientes con trombosis, pues, en estas imájenes normales, no hay interrupción de la corriente venosa, y, además, no existe circulación colateral. En el mismo sentido opinan Tagariello[18] y Wanke,[17] autores que se han ocupado minuciosamente de las causas de error en la interpretación flebográfica, y que sostienen que cuando no hay colaterales no hay obstrucción venosa aunque radiologicamente pueda observarse un stop. Asi pensamos nosotros pués todas nuestras flebografías nos autoriza a tal afirmacion.

Evolución y pronóstico: Estas trombosis primarias del miembro superior evolucionan, generalmente, hacia la curación y su curso clínico es relativamente benigno; en algunas oportunidades pueden prolongarse algunos meses. El pronóstico es favorable y la recuperación, en general, es total, al cabo de unas semanas. Las secuelas postrombóticas en el miembro superior no tienen la gravedad ni la frecuencia que las del miembro inferior.

En algunos casos, afortunadamente escasos, pueden persistir durante varios meses, ciertos síntomas: edema, torpeza o pesadez del miembro, etc.

Complicaciones: La trombosis del miembro superior por esfuerzo es muy poco embolígena; sin embargo, se han comunicado algunos casos de embolia pulmonar, uno de ellos mortal (Moure[19]).

La bilateralidad de la trombosis se comprueba en el 2%, segun Hughes,[6] Olivier y Leger[5] y Pfleuger.[7]

La propagación de la trombosis hacia las venas del cuello, lo mismo que la gangrena son excepcionales, aunque han sido relatadas—Olivier y Leger.[5]

Etiopatogenia.—Con respecto al estudio de la etiopatogenia comienzan los problemas, pués todavia no existe, sobre el particular, suficiente claridad.

Se han emitido tres teorías; la *infecciosa,* la *nerviosa* o *espasmódica* y la *traumática.* Dejando de lado la *infecciosa,* desde que no existe fiebre, ni leucocitosis, ni repercusión del estado general, y, además, porqué los pocos casos operados—Mondor, citado por Olivier y Leger,[5] demostraron que, en el cultivo, los trombos eran, generalmente, asepticos. Y, dejando la teoria *espasmódica* o *nerviosa* para cuando nos ocupemos del tratamiento quirúrgico, nos referiremos, especialmente, a la de naturaleza traumática.

Indudablemente, como decia Matas,[20] el traumatismo o esfuerzo, en una forma u otra, es el *primum movens* en la gran mayoría de los casos. Este esfuerzo, violento o atenuado, súbito o reiterado, debe ser considerado como el factor determinante del sindrome que estudiamos.

El traumatismo indirecto—esfuerzo—explicaría la mayor incidencia de este sindrome en el hombre, que en la mujer, y su preferencia por el brazo derecho.

El traumatismo indirecto—esfuerzo—actuaría, estando el brazo en abducción forzada, con o sin rotacion lateral, lesionando la íntima de la vena axilar o subclavia y desarrollando consecutivamente la trombosis. Los factores que explicarían la lesion venosa en el momento de la abducción del miembro superior se pueden agrupar en dos sectores, a) factores de orden *anatómico,* b) factores de orden *fisiológico* o *anatomofisiológico.*

Factores de orden anatómico.—Espacio costoclavicular estrecho: Diversos autores, entre los que podemos mencionar a Loehr,[1] Falconer y Wedbell,[21] Sampson, Saunders y Capp,[11] y a Judovitch, Bates y Drayton,[22] consideran que la vena subclavia puede ser lesionada, en la abducción, al pasar por un estrecho espacio costoclavicular. Siempre en el mismo orden de ideas—estrechez del espacio costoclavicular—Sampson y col,[11] piensan que tambien juega un papel importante la inserción del escaleno anterior en la primera costilla pues estrecha, en ciertos casos, aún más, el pasaje del trayecto venoso subclavioaxilar. Los mismos autores, Sampson y col,[11] consideran que aún sin abducción forzada puede lesionarse la vena subclavia en pacientes con cifosis, escoliosis, o, en aquellos, que tienen un tórax profundo y ancho, o que tienen caídos, hacia atras, los hombros; en todos estos casos, la primera costilla es proyectada contra la clavícula y puede, en un movimiento intempestivo, apretar y lesionar la vena subclavia.

Músculo subclavio y ligamento costocoracoideo: Sin abandonar la opinión de la importancia que tiene un espacio costocla-

vicular estrecho, otros autores, le atribuyen un papel etiopatogénico decisivo a la hipertrofia del músculo subclavio y a un fuerte y cortante ligamento costocoracoideo. Mac Carthy,[2] Lowenstein,[23] Gould y Patey,[24] y, entre nosotros, Christmann y Lyonnet,[25] le atribuyen la mayor importancia al musculo subclavio y al borde inferior del ligamento costocoracoideo—que forma parte de la fascia clavipectoral—y que suele ser muy fuerte y agudo, en la lesión traumática de la cara superior de la vena axilar, cuando ésta está distendida y elevada durante los movimientos exagerados de abducción del brazo.

Lowenstein,[23] Gould y Patey[24] y otros, consideran que la vena axilar el pasar sobre la primera costilla para convertirse en subclavia, tiene, con regular constancia, una válvula que puede ser comprimida y lesionada por el ligamento costocoracoideo dando lugar a la trombosis venosa. Por su parte, Veal y McFetridge,[15] le otorgan importancia a la acción de la cabeza humeral, a través del músculo subescapular, sobre una vena axilar que se ofrece estirada y elongada durante la abducción forzada y rotación lateral del brazo.

Wright[26] considera que la hiperabducción determina una accion traumática del pectoral menor y de la apófisis coracoides.

Wulsten,[27] piensa que fascículos musculares, tendinosos o aponeuróticos de caracter anómalo, igual que los osteomas, pueden comprimir a la vena axilar o subclavia en algún sector de su recorrido; entre los fasciculos músculares anómalos hay que recordar el arco axilar de Langer, que une el dorsal ancho con el pectoral mayor.

McLaughlin y Popma[28] afirman qué, por lo menos en un caso operado por ellos, la angulación, lesión venosa y trombosis de la vena axilar se debía a la elevación de la primera costilla por contracción del escaleno anterior motivada por una costilla cervical.

Muchos autores han relatado trombosis subclavioaxilares por esfuerzo; solamente mencionaremos, por su experiencia a Hartmann[29] y a Ochsner, De Bakey y Smith.[30]

Otros cirujanos, como Neij[31] opinan que es indudable la accion traumática durante la hiperabducción pero que la lesión venosa se produce por una causa y un lugar—del trayecto axilosubclavio—desconocidos. Hughes[6] le atribuye importancia al descenso, por adelante de la vena subclavia, del nervio frénico.

Factores de orden anatomofisiológico.—Estásis venosa axilar: Pavlovsky[9] y Piccagli[32] consideran que, a nivel del lugar donde la vena basílica se transforma en axilar, existe un ensanchamiento constante, en el cuál desembocan numerosas colaterales—humerales profundas, acromiotorácica, circunflejas, etc.—y qué, por consiguiente, se establece cierta estásis venosa; cuando el paciente realiza un esfuerzo, con hiperabducción, la fascia clavipectoral se pone tensa por la contracción del pectoral menor, la vena axilar es traccionada hacia adentro mientras la vena cefálica lo es hacia afuera, y, como consecuencia de esta elongación venosa, se pueden producir pequeñas roturas venosas de las colaterales, con la subsiguiente lesión de la íntima y trombosis de la vena axilar.

Presiones venosas opuestas: Contribuye a respaldar la opinión de los que piensan en la rotura de pequeñas venas colaterales a nivel del lago venoso axilar, la circunstancia de que durante un esfuerzo, ejecutado por el miembro en abducción, la contracción muscular impulsa la sangre venosa hacia el tórax, pero, al mismo tiempo, el esfuerzo ha elevado la presión endotorácica negativa y, por consiguiente, se establece una doble presion venosa ejercida en sentido opuesto en los extremos de un sistema canalicular poco elástico y que contribuirá a intensificar la estásis venosa a nivel de la iniciación de la vena axilar, con la pro-

bable rotura de colaterales y trombosis subsiguiente.

Tratamiento.—El tratamiento de las trombosis por esfuerzo del miembro superior es, fundamentalmente, médico.

Las medidas terapeuticas que deben indicarse son: *reposo en cama, vendaje elástico* del miembro afectado, el *brazo en alto, ejercicios activos de la mano, tratamiento anticoagulante*—heparina y dicumarol—y, si hay dolor, *fenilbutazona.*

La infiltración del ganglio estrellado, con novocaina, debe prescribirse en los casos que exista intenso edema y que el dolor no ceda con los analgésicos. En ciertos casos la papaverina es útil.

Con estas medidas conservadoras, generalmente, a los 10 o 20 días, el cuadro clínico comienza a desaparecer y se entra, rapidamente, en la convalescencia, aunqué, como ya lo hemos dicho, en algunos casos, ciertos signos o síntomas, como el edema—discreto—la circulación colateral y la pesadez o torpeza del miembro, puedan arrastrarse algunos meses.

El tratamiento quirúrgico queda reservado para dos situaciones. Una de ellas, lo determina el fracaso del tratamiento médico, correcta y prolongadamente realizado. En efecto, en algunas circunstancias, afortunadamente pocas, el paciente no mejora, el proceso se prolonga durante meses con la misma intensidad y, entonces, se debe pensar que algún factor de orden anatómico está comprimiendo el trayecto subclavioaxilar y produciendo trombosis iterativas. En tales situaciones—de 6 a 10 mese de duración—se debe operar. La intervención consistirá en la cuidadosa exploración sub y supra clavicular para descartar cualquier factor normal o anómalo que lesione la vena. Durante la intervención si existe trombosis se procederá a la *flebectomía;* si solamente hay espasmo venoso, *flebolisis*—Martorell.[33] La otra situación o circunstancia que aconsejará el tratamiento quirúrgico la constituyen aquellos cuadros típicos de trombosis venosas subclavioaxilares por esfuerzo, con edema, dolor, circulación venosa colateral, cianosis, comienzo súbito, etc., y qué, flebograficamente se demuestra que no hay *stop* venoso en el trayecto axilar y subclavio; es decir en aquellos pacientes que repiten su sindrome porqué tienen una *oclusión venosa intermitente.* Esta opinión, de que no es obligatorio que exista trombosis venosa para que se desarrolle el mismo cuadro clínico fué sostenida, en 1934, por Rudolf Matas,[20] y en 1951, por McCleery, Kesterson, Kirtley y Love.[34] En realidad, la posibilidad de que factores perivenosos, ya sea directamente, o a través de un mecanismo reflejo, por irritación nerviosa—teoria espasmódica—llegaran a producir el sindrome que estudiamos, fué defendida, calurosamente, por Cottalorda[35] y Lapeyre,[36] en 1932 y 1933.

No cabe duda que la intervención quirúrgica que ofrece mas posibilidades de éxito es la que ataca las causas extravasculares de las oclusiones venosas intermitentes. La táctica quirúrgica consistirá en explorar minuciosamente todo el trayecto venoso subclavioaxilar por debajo y por encima de la clavícula. Por este motivo no puede indicarse una sola técnica, pués, en el campo operatorio, pueden encontrarse relaciones anatómicas distintas a las habituales. Esta conducta fue la propuesta a la paciente que figura en nuestra casuística como Caso 4, y qué presentaba una oclusión intermitente axilosubclavia a pesar del correcto tratamiento instituido.

En estos casos, lo fundamental consiste en explorar y liberar el trayecto venoso de todos sus vínculos.

En la región infraclavicular debe ser minuciosamente investigada—colocando el brazo en distintas posiciones de abducción y rotación lateralla acción del pectoral menor, pués podría ser necesario su sección; es de la mayor importancia la disección del espacio costoclavicular, las fibras

tensas que puedan existir en su entrada deben ser seccionadas, lo mismo que el ligamento costocoracoideo, cordones pleurovertebrales; un músculo subclavio excesivamente desarrollado debe ser resecado parcialmente. El músculo de Langer, restos de un músculo cutáneo animal en la región axilar, debe ser seccionado, aunqué no tiene la importancia patológica que se le había atribuído antes.[17] Naturalmente, debe ser resecado todo elemento conjuntivo o muscular de carácter anómalo que se descubra.

Con respecto a un estrecho espacio costoclavicular se han propuesto tres conductas: resecar la clavícula, resecar la primera costilla y seccionar el escaleno anterior para que la primera costilla descienda y el espacio costoclavicular se amplíe; consideramos que esta última conducta, si es suficiente, debe ser la indicada; en el mismo sentido opinan Skogstadt,[37] Wyburn-Mason[38] y Lapeyre,[36] entre otros.

Si no se encuentra una causa infraclavicular, axilar o costoclavicular, el cirujano debe explorar el espacio supraclavicular—con o sin resección clavicular. En esta región, aunqué no es lo común, pueden existir razones anatómicas de compresión venosa, o, por lo menos, de irritación simpática espasmódica; las costillas cervicales son, a menudo, las responsables del sindrome y deben, por consiguiente, ser resecadas. La resección de una costilla cervical debe ser completada por una escalenectomía. Si no hay costilla cervical debe investigarse la posibilidad de contracciones del escaleno anterior—escalenectomía—o la existencia de fascículos musculares anómalos pertenecientes al escaleno anterior, o, eventualmente, a otro grupo muscular.

Wanke,[17] sostiene que ha podido comprobar la presencia de cercos callosos en antiguas afecciones de la cúpula pleural que engloban la vena axilosubclavia.

Si en el transcurso de ésta exploración se llegara a encontrar trombosis venosa debe efectuarse la flebectomía, y si, solamente, hay espasmo venoso, la flebolisis. Esta flebolisis debe comprender la adventicia y, por consiguiente, representa una intervención sobre el simpático—Balas.[13]

Existen autores que son decididos partidarios de la conducta quirúrgica en el sindrome que estudiamos. Por ejemplo, Kleinsasser,[39] opina que los tratamientos conservadores dejan un 75% de posibles recidivas. Del mismo modo piensan Lowenstein,[23] Gould y Patey,[24] Loehr,[1] Neij,[31] Sampson, Saunders y Capp[11] y McCleery, Kesterton, Kirtley y Love,[35] entre otros. Estos últimos autores, McCleery y col.,[34] han operado, en 1951, a 5 pacientes, encontrando, en 3 de ellos, a la vena axilosubclavia comprimida por el ligamento costocoracoideo, que estaba practicamente fusionado con la pared venosa. En los 2 casos restantes la causa residía en el músculo subclavio y en una contracción del escaleno anterior. Según estos autores, con la intervención se logró la curación. A pesar de esto, nosotros, seguimos la linea conservadora en el tratamiento de las trombosis por esfuerzo del miembro superior, con las excepciones indicadas anteriormente: trombosis iterativas o de curso tórpido y las oclusiones venosas intermitentes con venoespasmo y ausencia flebográfica de trombosis.

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Four years ago a surgeon of about forty was forced, by a rising blood pressure, inability to concentrate, headaches becoming at times intolerable, and failing vision, to resign his university post and abandon his practice. He underwent the operation of bilateral splanchnicectomy, and immediately lost all his symptoms and returned to a normal blood pressure. He obtained another post at a university in another State. . . . I had not the good fortune to meet him, but I met many of his colleagues, and they all agreed that he was now able to work as hard as any of them. To my question as to whether he was as good a man as before his symptoms appeared, they replied that he had lost some of his fire; he was not the 'go-getter' he used to be, but he was still a fine surgeon. Many of us are apt to become less energetic between forty and forty-four, without the excuse of an operation to explain it, and would count the loss of some enterprise a small price to pay for rescue from idleness, imminent blindness, and impending death. It is cases like this—and they are by no means rarities—that illustrate the possible value of surgery in hypertension, and provide a reason for its fuller study.

—Ogilvie

Editorial

Nursing in the Social Order

EMILY C. CARDEW, M.S.*

CHICAGO, ILLINOIS

THE PROBLEMS of providing adequate nursing and nursing care have become the concern of an increasing number of groups. Nurses and nursing have been subjected, during the past decade, to considerable criticism and comment by allied professional groups, by consumers of nursing, and by the press. Many of these groups offer panaceas for what they consider the shortcomings of nursing; many place the blame for whatever shortcomings we may have (and nursing is extremely critical of itself) upon the leaders of organized nursing and nursing education.

Nursing as a service profession, dedicated to meeting the needs of humanity, must be sensitive to these comments rather than defensive, considering their relevance objectively. Individual nurses contribute to trends in nursing, and the organized profession attempts to influence the direction that nursing should take. Nursing practice and nursing education, however, are the result of many scientific developments and social forces. It is only through an examination of these influences that we can describe how we arrived where we are today, or chart with a fair degree of accuracy the direction we should be taking.

In order to do this, it may be helpful to examine nursing at various stages of its development toward professionalism in relation to such factors as medical practice, social economic conditions and educational patterns.

The editorial pages of the Journal of the International College of Surgeons *will continue to be honored by presentations of rare and extraordinary historic value, the lectures presented at the International Surgeons' Hall of Fame on medical and surgical history from the earliest recorded achievements to those of our own times. We believe that* Journal *readers who were not able to attend the lectures will find them as exciting as did the audiences present at their delivery. The story of progress in the healing arts and the giants of medicine and surgery to whom we owe the amazing brilliance and scope of modern achievements is intrinsically thrilling and is a vital part of the education of every cultivated man and woman, inside or outside the profession. It is altogether fitting that it should appear in these pages, since the International College of Surgeons is first, last and always a teaching institution.*

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It is generally agreed that the first step toward the development of nursing as a profession was the organization of the Nightingale School at St. Thomas' Hospital, London, in 1855. Prior to that time, any educational preparation for nursing was part of the general preparation for social and charitable works in a limited number of religious orders.

There were two principles upon which Miss Nightingale established this school: complete financial and administrative independence from the hospital (St. Thomas' School had an endowment of approximately $200,000) and employment of a qualified *nurse* faculty. All lecturers, including physicians, were reimbursed and held to high standards. These two principles remain unmet goals for most nursing education today. The Nightingale pattern was adapted rather quickly by a few outstanding hospitals in the United States; nevertheless, because of the resistance of Americans to "class distinction," one characteristic was not copied. Miss Nightingale had provided for the admission of two categories of students: "lay probationers," to be prepared as bedside nurses, and lady probationers, intended to be leaders who would spread the Nightingale system. More important, the principle of independent financial support of the school was almost immediately lost.

It is always interesting to speculate on what nursing education would be today had we adhered more closely to the pattern of education advocated by Miss Nightingale. Some of the variances and their implications will be discussed later. First let us look at the general picture in the United States at that time, particularly the status of women, since, except within a few male religious orders, nursing was purely an occupation for women.

Hospitals at that time were primarily for the care of the medically indigent, and, in most instances, provided deplorable care. Medical practice itself was relatively simple and unsophisticated. The primary contribution nursing could make was provision of hygienic and comfort measures.

Although the industrial revolution was well under way, the notion of "career opportunities" for women was nonexistent. It is doubtful that little girls were asked, "What are you going to do when you grow up?" Women sought employment only if unmarried or in dire economic circumstances. Education for women, even though existent, had no relation to a career. A smaller precentage of the female population entered high school than completes college today.

The colleges and universities, with the exception of the developing land-grant colleges, were devoted primarily to the education of gentlemen in the liberal arts and learned professions. Education for the few women who were so privileged as to attend was essentially in the fine arts and in the graces believed essential to successful marriage.

One becomes rather wistful when one contemplates the possible position of nursing and nursing education today had there been a coeducational system of higher education, with programs to prepare women for a wide range of professions, and had young women in general thought and planned in terms of careers. Implementation of the Nightingale principles would undoubtedly have led to the establishment of preparation for nursing in institutions of higher education. In fact, however, the beginnings of nursing education arose during a period when such programs were needed desperately.

It is not surprising that, although the first pioneer schools in the United States were developed in order to *prepare* nurses for practice in hospitals and homes, hospitals were quick to recognize the marked improvement in the care of patients. During a rapid expansion of hospital facilities,

there was a parallel expansion of schools of nursing. Unfortunately, many schools were organized for the primary purpose of supplying the hospitals with nursing care. Upon their graduation these young women, many little better equipped than nursing personnel without schooling, were turned loose on the public for the practice of "private duty nursing."

It is to the undying credit of nurses themselves, alumnae of the schools who maintained their integrity (and Illinois can be proud of some of these early schools and leaders), that rather militant steps were taken. First, associated alumnae associations, and later the American Nurses' Association, moved to set minimum standards for the practice of nursing through licensure, therefore, for the standards of schools whose graduates were eligible for licensure. By 1918, all the forty-eight states then existent had legislation at least protecting the title of "registered nurse." Although this legislation set minimum standards, the quality of education varied widely; and so, inevitably, did the quality of nursing care.

It is significant that this same period was the one in which women were striving to secure equal civil rights and equal educational opportunities. The women who pioneered in nursing may be compared to those who pioneered in other fields. Because of the status of women at that time, they stood out as individualists.

Teachers' College at Columbia University set up the first postgraduate program for registered nurses who desired training as teachers and administrators. World War I had its influences, only one of these being the attraction of college-prepared women into nursing through the development of the "Vassar Training Camp." The graduates of this program have been among the leaders in the past twenty-five years and have exerted much influence upon the direction of nursing. Those of us who have felt this influence regret that most of these women have now reached the age of retirement.

The period of the 1920s could be used to summarize this era in nursing and to project a new one. As a nursing product of that era one finds it difficult to obtain what historians call the proper perspective, but it may be profitable to look at nursing in the '20s in view of the marked effects of the "Great Depression" of the 30s.

Girls in the high schools of the 20s had some opportunities, but little encouragement, to think of careers that involved preparation beyond high school. There were no career days, no vocational counsellors; the vast majority of these young women did not anticipate the necessity of earning a living. Families who thought of advanced education for their daughters —and they were few, though increasing— thought in terms of liberal education or preparation for teaching. Although nursing had almost equal attraction as a career for women, matriculation in a school of nursing was not considered the same as entering a college, or even a normal school. Tuition, room, board and other prerequisites were free, and almost all schools of nursing offered a monthly stipend. Two groups entered: (1) girls of the lower economic levels and (2) girls who were "social service minded."

Hospitals large enough to operate even a school of minimum standards were staffed almost entirely by student nurses. The very best hospitals employed licensed registered nurses as head nurses; in others, all but the top administrative positions were filled by the senior students. Employment for the graduates of these schools was limited to private duty (the largest field), administrative positions (for the select few) and extremely limited opportunities in public health nursing services.

Nurses were considered to have a *call-*

ing rather than a *career,* and little attention was paid to the hours they worked, the amount of time they were allowed for leisure activity or the level of their remuneration. Society and nurses considered the nurse somewhat set apart and accepted this status as inevitable in the nature of the work.

Then came the great depression. Hospitals, often operating under a generous paternalistic system, opened their doors to their alumnae and provided free room and board in exchange for services in a relatively new field—general duty nursing. District nurses' associations, faced with mass unemployment of private duty nurses, were able to put into effect voluntary tours of duty involving an eight-hour day (although a fifty-two hour week). And, as belts were drawn tighter, hospital administrators began to consider more carefully the recommendations of the Winslow-Goldmark Report (1918) and *Nurses, Patients and Pocketbooks* (1928), which pointed out the necessity of providing sounder nursing education, and the uneconomic aspects of attempting to pay through student services for a really fine educational program.

Factors Influencing the Nursing Profession.—The factors that have or *should* have influenced nursing since that time have been complex and breathtaking:

1. *Advances in Medical Science:* Advances in medical science and changes in medical practice, diagnosis and therapy represent one of the most obvious influences upon the practice of nursing and, therefore, on education for that purpose. Nursing in the early days really fitted the literal derivation of the term "nurturing." Nurses were primarily concerned with the hygienic needs of the patients and with his comfort. These were simple and were based upon arbitrarily determined standards rather than scientific principle.

The nurse engaged in these nurturing functions, however, came to know her patient very well and was able to give supportive emotional care intuitively, without the advantages of knowledge of the behavioral sciences.

Rapid advances in medical technology have been responsible for the passing on to the registered nurse many of the functions formerly assumed to be medical. She, in turn, has of necessity delegated many of her former functions to the licensed practical nurse and to the nurse's aid. This trend has been so rapid that we now find the nurse's aid performing functions that were the prerogative of the physician twenty years ago.

Perhaps one of the most startling changes in nursing has been a result of advances in drug therapy. The distribution of drugs was, in the 20s, a relatively simple procedure, involving one hour of one nurse's time three times a day. Now it is not uncommon to find one or two nurses assigned to a hospital unit for the full-time administration of medicaments.

There has been, of course, a parallel development of the whole concept of public health and a rapid expansion of health services; there has been new emphasis on prevention and on rehabilitation. All of these advances involve the nurse in more diverse responsibilities, and all of them widen the field in which she works, extending it outside the hospital walls into homes, schools, industries and public health agencies.

2. *Complexity of Hospital Organizations:* Closely related to the changes in medical science, and to a degree because of them, is the ever-increasing complexity of hospital organization. And in the administration the nurse continues to play a key role. Even with the delegation of many non-nursing functions to other departments (i.e., housekeeping, dietary activities, etc.) the nurse has had an ever-increasing load

of complex administrative functions. She is dealing daily with a myriad of different workers, all with different educational backgrounds, from many different ethnic and cultural environments. The developments of her relations with these workers imposes tasks very different from those she dealt with when the hospital staff was composed of physicians, nurses and a very few housekeeping or dietary workers.

3. *Population Trends:* There has been much concern with the rapidly expanding population and its needs. Somewhat less attention has been paid to the changing composition of our population and the implications of this for our workers.

Nurses, as well as other workers, are faced not only with the necessity of caring for more and more persons but with the complex problem of learning to develop relations with people from many cultural and ethnic groups with which she has had no previous contact. This problem is made more complex, rather than easier, because of early ambulation, improved therapy and the shortened period of hospitalization.

4. *Education and the Status of Women:* One of the marked phenomena of a decade has been the almost total shift in the attitude toward women in employment, education and careers and the opportunities available to them. The total percentage of young persons going on to college has increased, but the increase in the number of women in this college population has been even sharper. High school girls today show almost as much interest in career planning as do young men. Even with the trend toward early marriage, there is a strong and growing sentiment that young women should be prepared for economic self-sufficiency.

As wider and wider opportunities are opened to young women, the intelligent young person appraises and compares. The advantages that any given field has to offer, in terms of the kind of life she will be able to lead, are strong determinants of her ultimate choice.

5. *Changes in Conditions of Employment:* When we discuss the social changes in our era, we cannot overlook changes in the total attitude toward employment and working conditions. We have come a long way since the days of the Industrial Revolution, when workers were flagrantly exploited and the individual worker had no recourse if treated unfairly.

The ethical and legal right of the worker to be represented in negotiations with his employer is now recognized. Realization of the relation of working conditions to hours of work, to good work and health and to the need for leisure time, as well as to minimum wage, have created a new era for employees, both men and women.

6. *World War II:* It was during the period following World War II that nursing again undertook a real analysis and appraisal of its progress and needs. During this period we have (a) developed criteria for sound university preparation in nursing and begun, at least intellectually, to encourage increasing percentages of young persons to prepare in this way; (b) developed an economic security program that gives equal emphasis to the nurse's right for representation in determining working conditions *and* her legal and ethical responsibilities to her employer and the patient, and (c) developed an extensive research program (supported financially by nurses) to analyze (a) the functions of nursing and (b) the scientific basis of nursing practice. All of these changes have been reflected, during the period in which they took place, to varying degrees in the practice of nursing.

Advances in medical science, and the resultant broadening of the nurse's functions has resulted in additions to the nursing curriculum. In general, these changes have been merely additive, without real

revision of the total structure and purposes of the school.

Essentially the same influence was exerted by the increasing complexity of the hospital. This too resulted in additions to the curriculum, but these were limited by the lack of a thorough analysis of the content essential to the training of a competent practitioner. Hospital schools charged with the dual responsibility of care of patients and education of students had little freedom to experiment or to initiate new programs; valiantly and at extreme cost, they added more and more content. Because we had not recognized the need for two "levels" of nursing, the technical level "licensed practical nurse" was introduced, but without acceptance or understanding of the function of such a nurse by many of her colleagues in the profession.

Recognizing the appeal of college education to women, many hospital schools added two or more years of general education to the existing curriculum in nursing *without bringing the nursing portion up to the generally accepted standards of university education.*

What of the Future?—Nursing was developed because of a social need. It has had to be responsive to changing health needs of the people, advances in medical practice, changes in hospital administration and expanding health services. The extent to which it can keep pace with these accelerating needs will depend largely upon its response to other social trends.

With a new attitude toward the education and employment of women, the concept of the nurse as one with a calling, and therefore not desirous of any other life, must change. The nurse is a career worker with the aspirations, rights and privileges of other career workers. Although this concept need not and demonstrably does not detract from the humanitarian components of nursing, society must be cognizant of the necessity for the kinds of working conditions essential to all workers. Great strides have been taken by nursing in this direction, but some nurses, as well as some outside of nursing, think it not quite "seemly" for nurses to place any importance upon this aspect of the matter.

We have noted Miss Nightingale's principles for the sound administration of a school in order that students might be free to learn. This is the principle most frequently violated and one that is met by very few schools today. Had Miss Nightingale developed her program in 1960 instead of 1860, the college or university would have been the site for her experiment. With a vast system of higher education, equal opportunities for men and women and colleges offering preparation for a wide range of professions, this would have seemed the logical choice.

As has been mentioned, education for nursing was established long before university educational programs for women or for the professions became popular. It was developed when there was a crucial need for women with any type of preparation in the care of the sick. The maintenance of a school of nursing became an economic advantage to the hospital. This pattern, set by a historical accident, has persisted to the present day. With larger and larger numbers of young women entering college, and with all other professions having the advantage of college training, only 15 per cent of the student nurse population is so privileged.

Lacking the "historical perspective" required to determine why nursing, so responsive to some trends, has lagged so far behind in response to others, we can only offer some well-considered judgments:

First, of course, is the economic picture. Hospitals, even those with very fine diploma schools, still depend to varying extent (but all to some extent) upon student service.

Sentiment and tradition play a large role, as do vested interests. Nurses themselves, brought up in a pattern of authoritarianism rather than independent judgment and tradition rather than scientific analysis, find it difficult to accept new patterns of preparation. Many actually believe that the introduction of a nursing curriculum into institutions of higher learning will weaken the fundamental values nursing has always cherished. With a large percentage of nurses lacking the advantages of university preparation, they are fearful of what this will do to future practice.

The older nurse, observing the prospective practitioner of nursing with more clearly defined career goals, with greater independence in planning her own life and future and perhaps with somewhat more materialistic views, is apt to equate these things with differences in nursing education rather than with changes in our total social structure, of which candidates for our school of nursing are products.

The majority of practicing nurses, isolated as they have been from daily interchange with members of the professions represented in the university structure, may not realize that dedication to one's fundamental purposes and a high sense of personal responsibility toward one's work are associated equally with the other professions. We have not had the opportunity to realize that a personal commitment to ethical values can be developed and matured by a student's contact with the liberalizing arts and sciences.

To put it succinctly, we need to demonstrate that there is no positive correlation between advanced preparation and unkindness; that preparing a practitioner by a sound educational pattern will not lessen her respect for the dignity of work.

I hope that I may be forgiven for so much emphasis upon education, both in terms of the historical view and in terms of our present dilemma. Because of my position as a Dean of a College of Nursing, this emphasis is perhaps to be expected. In the larger view, however, we must recognize the fact that the purpose of education is to prepare young people for their roles in the society of the future.

Nursing, which has been so responsive to some of the advances in medical care, must also be responsive to trends in total health care, in the educational system and in the total social-economic structure of the nation. Because nursing and nurses play such a vital role in the lives of human beings, the needs of nursing must be explained to the public in terms that will elicit understanding and support.

Few things are harder to put up with than the annoyance of a good example.

—Mark Twain

Experience is of no ethical value. It is merely the name men give to their mistakes.

—Wilde

Everything happens to everybody sooner or later if there is time enough.

—Shaw

European Federation Founds New Scientific Committee

The Editorial Board takes great pleasure in announcing the organization, by the European Federation of the College, of an authoritative Scientific Committee, now complete and functionally effective.

The purpose of the Committee is to arouse interest and mobilize activity in original scientific studies within the framework of the European Federation and to encourage the presentation of these studies and their results in the *Journal.* It will appraise impartially all articles submitted to its judgment and will recommend for publication those it considers significant contributions to professional knowledge and worthy of international attention.

The Scientific Committee is composed of distinguished representatives of the constituent Sections of the European Federation. The chairman is **Prof. A. M. Dogliotti** of Torino, Italy, President of the International College of Surgeons. The other members are as follows:

Asst. Prof. M. M. Allgower, Chur, Switzerland
Prof. A. W. Fischer, Kiel, Germany
Prof. P. Huber, Innsbrück, Austria
Prof. A. Kummer, Amsterdam, The Netherlands
Prof. A. Lacquet, Louvain, Belgium
Prof. L. Leger, Paris, France
Prof. N. Louros, Athens, Greece

The importance of this development in international publication would be difficult to exaggerate. The services of the Committee will satisfy a long-felt need of the *Journal* by selecting "from home base," so to speak, the articles that best reflect the magnificent contributions of European surgeons to the immense and growing treasury of scientific knowledge throughout the world.

PHILIP THOREK, M.D., *Editor*

The Ideals of the International College of Surgeons: An Affirmation*

The International College of Surgeons, believing in the individual responsibility of the surgeon, based on moral principle and scientific conviction, hereby affirms the ideals to which its members are dedicated:

To foster the highest and most skilled services of the surgeon to humanity, in accordance with the best dictates of his conscience under the will and guidance of God;

To maintain an international brotherhood of surgeons aiming toward the diffusion of surgical knowledge in cooperation with all established surgical societies, throughout the world, whose goals are similar;

To safeguard the freedom of the surgeon from political influence and tyranny, from overburdening and distracting constraints, and from interference with his practice of the healing arts;

To strive with good will for improvement in the standards of surgery and surgeons in all nations, and for concomitant improvement in surgical nursing, hospital facilities and all associated adjuncts to medical care;

To promote international surgical collaboration, the exchange of new methods and developments in all surgical specialties, every fruitful study of surgical techniques and discoveries, and every organized effort to disseminate the new knowledge gained;

To provide assistance, within constitutional and individual limits, to medical missions of all faiths to whose care are entrusted surgical problems of every nature;

To establish scholarships and local and international training programs, and to arrange meetings on all levels among surgeons in all countries;

To continue to develop the International College of Surgeons as the initial and outstanding international surgical organization in aims, ideals and membership, and

To continue its dedicated efforts in the immense task of alleviation of human suffering through surgical skill, and of building and maintaining in the minds and hearts of surgeons everywhere the highest principles of service to humanity and the strongest possible conviction of their great and responsible destiny in the divine plan.

John P. Cogley, M.D., F.A.C.S., F.I.C.S.
Council Bluffs, Iowa

*Suggested to the author by the memory of Dr. Max Thorek, beloved Founder of the International College of Surgeons.

New Books

BOOKS RECEIVED

The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

Light Coagulation. By Gerd Meyer-Schwickerath. Translated by Stephen M. Drance. St. Louis: The C. V. Mosby Company, 1960. With 55 illustrations, 7 in color. *Reviewed in this issue.*

Surgical Diseases of the Chest. Edited by Brian Blades. St. Louis: The C. V. Mosby Company, 1961. Pp. 580, with 260 illustrations. *Reviewed in this issue.*

The Operations for Inguinal Hernia. By Mark M. Ravitch, and James M. Hitzrot. St. Louis: The C. V. Mosby Company, 1960. Pp. 64, with 27 illustrations. *Reviewed in this issue.*

A Clinical Prospect of the Cancer Problem (Introductory volume of **Monographs on Neoplastic Disease at Various Sites**). By D. W. Smithers. Baltimore: The Williams and Wilkins Company, 1960. Pp. 232, with 46 illustrations and 10 tables.

Les Cavités Cardiaques: Introduction Anatomique a la Chirurgie Intracardiaque (The Chambers of the Heart: An Anatomic Introduction to Intracardiac Surgery). By E. Henry, R. Courbier and P. Rochu, with a preface by R. de Venrijoul. Paris: Masson et Cie., 1960. Pp. 176, with 196 illustrations.

Thymectomy for Myasthenia Gravis. By Henry R. Viets and Robert S. Schwab. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 130, with 32 illustrations.

Experiences with Congenital Biliary Atresia. By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

Clinical Gastroenterology. By F. Avery-Jones and J. W. F. Gummer. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 652.

The Femoral Neck—Function, Fracture Mechanism, Internal Fixation: An Experimental Study. By Victor H. Frankel, Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 119, with 58 illustrations.

Congenital Malformations: A Ciba Foundation Symposium. Edited by G. E. W. Wolstenholme and C. M. O'Connor. Boston: Little, Brown and Company, 1960. Pp. 308, with 91 illustrations.

General Anesthesia for Neurosurgery. By Robert I. W. Ballantine. Boston: Little, Brown and Company, 1960. Pp. 152, with 68 illustrations.

Experiences with Congenital Biliary Atresia. By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

Calcium Metabolism and the Bone. By Paul Fourman. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 325, with 7 illustrations.

Chemical Osteosynthesis in Orthopaedic Surgery. By Michael P. Mandarino. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 72, with 36 illustrations.

Surgical Diseases of the Chest. Edited by Brian Blades. St. Louis: The C. V. Mosby Company, 1961. Pp. 580, with 260 illustrations.

This new volume on surgical diseases of the chest, edited by Brian Blades, is the most complete and up-to-date work available on the subject. The eighteen authors, among whom are a number of the most outstanding names in the field, present in a simple and straightforward manner the fundamental facts about the various conditions, avoiding unnecessary discussion.

The first chapter concerns basic physiology, and those fundamental physiologic principles involved in thoracic surgery are briefly and adequately presented. A nine-page bibliography is included. A short chapter on preoperative and postoperative care follows, in which the important points concerning patient care and management so essential to safe handling of the patient in this special field are outlined. Next, a good discussion of thoracic trauma, its effect on respiratory function and its proper management is presented. Anomalies and tumors of the chest wall and diaphragm are more briefly but adequately discussed. More extensive consideration is accorded diseases and tumors of the pleura, lungs and mediastinum. There are separate chapters describing pulmonary tuberculosis and its treatment and the various conditions affecting the esophagus. The succeeding five chapters, "Diagnostic Cardiology," "Congenital Heart Disease," "Acquired Heart Disease," "Conditions Affecting the Aorta and Vessels" and "Extra-Corporeal Circulation and Hypothermia" constitute an excellent, concise and very timely presentation of developments in the rapidly moving field of surgical cardiology. Two brief concluding chapters are devoted to discussion of the ancillary procedures used in the diagnosis and treatment of thoracic disease and the use of anesthesia in thoracic surgical procedures.

Each chapter is followed by a carefully selected list of references useful to those who want further information on that particular subject. Throughout the volume, no time is wasted on technical details or discussion of controversial issues. The whole book consists of an orderly presentation of the material at hand and the many subheadings permit easy access to the various subjects.

The volume is profusely illustrated with excellent reproductions of roentgen rays, photographs of specimens and simple schematic drawings. It is printed in clear, sharp type on paper of excellent quality and bound in a sturdy practical material. The text is simple enough to be of service to the student, general practitioner or internist, yet detailed enough to satisfy the requirements of the thoracic surgeon or specialist in thoracic disease. The volume is excellent in every way.

THOMAS J. KINSELLA, M.D.

Light Coagulation. By Gerd Meyer-Schwickerath. Translated by Stephen M. Drance. St. Louis: The C. V. Mosby Company, 1960. With 55 illustrations, 7 in color.

In its present, accurately controlled form, the technic of light coagulation is a new and important method of treatment in the field of ophthalmology. Light rays emanating from a powerful source are focused on sharply circumscribed areas in the eyeground. The pigment epithelium of the retina absorbs most of the light and therefore sustains a burn. The results of such burns are closely related to the level of dosage and are therefore controllable and predictable. Mild burns may elicit reactive processes that produce localized chorioretinal adhesions, which are beneficial in the prophylaxis and treatment of retinal detachment. Heavier and more

extensive coagulations may destroy tumor tissue without seriously damaging the surrounding structures.

The originator of this new form of treatment is Dr. Meyer-Schwickerath of Bonn, Germany. He has designed, with the assistance of Dr. Littman of the Carl Zeiss Company, a special apparatus called the photocoagulator. Such instruments have been in use in several medical centers in the United States for about two or three years.

The book under review was written in German by Meyer-Schwickerath in 1959, after about ten years of intensive experimental and clinical work in the field of light coagulation. After his extended visit to Meyer-Schwickerath's clinic, Stephen M. Drance of Saskatoon, Canada, undertook and skillfully accomplished the task of translating the book into English. The product of this cooperative effort is a lucid, well-organized little book, suitable as an introduction to the subject of light coagulation.

The indications for photocoagulation largely overlap those for electrocoagulation, but there are a number of situations in which light coagulation is more effective and much more easily handled. A technic well established in ophthalmologic practice after not more than three or four years of use in fifteen to twenty medical centers, the light coagulation procedure may be expected to gain further in usefulness and importance, as both a therapeutic and an investigative tool.

PETER C. KRONFELD, M.D.

The Surgical Treatment of Facial Injuries. By Varaztad Hovhannse Kazanjian and John Marquis Converse. Baldsmore: The Williams and Wilkins Company, 1959. 2d ed. Pp. 1,110, with 1,155 illustrations.

This book contains an excellent full bibliography of the subject as well as carefully compiled index.

The contents are divided into thirty chapters, each of which takes up one separate aspect of the problems that confront one who is treating facial injuries. Many illustrations reveal studies made from microscopic slide preparations of tissues removed. The illustrations are excellent, but the subject matter is so voluminous that no book review could possibly describe the excellence of the text.

The work is highly recommended to anyone who has to treat facial injuries.

HORACE E. TURNER, M.D.

The Operations for Inguinal Hernia. By Mark M. Ravitch, and James M. Hitzrot. St. Louis: The C. V. Mosby Company, 1960. Pp. 64, with 27 illustrations.

The adoption of Lister's antiseptic methods made possible the long desired elective repair of inguinal hernia. The early post-Listerian technics, were, however, only slightly better than those described by Celsus in the first century A.D., and soon proved inadequate. The Bassini operation initiated the modern era in the surgical treatment of hernia in 1887, and other operations more or less resembling his appeared almost at the same time. These were followed in rapid succession by numerous modifications. The actual priority claims of the various procedures and technics have therefore been involved in general confusion.

The authors of this brief monograph have attempted to clarify this matter. The operations of a limited number of early authors such as Bassini, Halsted, Andrews, Ferguson and Lotheissen, are reviewed, excerpts and illustrations from their original publications are presented, and their methods are lucidly described. A short biographical sketch of each of these illustrious surgeons introduces the respective chapters. The concluding section of the book provides a detailed description of the operative repair preferred by the senior author, a procedure based on the Halsted method as modified by succeeding Johns Hopkins surgeons, which the author calls the Johns Hopkins hernia.

The information provided by this book is interesting and timely and will dispel some misunderstanding concerning this confused chapter in the history of surgery.

LEO M. ZIMMERMAN, M.D.

Abstracts from Current Literature

Spread of Cancer Cells and its Relation to Chemotherapy. Moor, G. E., Sandberg, A. A., and Watne, A., J. A. M. A. 172:1729, 1960.

The authors describe their method of collecting blood samples for tumor examination in 179 patients with advanced carcinoma. Fifty per cent of the samples contained tumor cells. The frequency of tumor cells varied with the type and stage of the disease; 73 per cent of patients with carcinoma of the lung had tumor cells in regional blood samples; 53 per cent of the tumors were gastric and 30 per cent colorectal. Resectable colorectal carcinoma showed a lower incidence of positive tumor cells. Such cells were more frequent in the blood of veins draining tumor sites than in peripheral blood. In the authors' opinion, tumor cells can probably pass through capillary beds.

The factors that encourage the spread of tumor are listed, as are the means with which to curb it. Most tumor cells released from the primary tumor are promptly destroyed. Dissemination of these cells and the use of anticarcinomatous agents are discussed.

JOSEPH BERKE, M.D.

How to Manage Pain in Malignant Disease. Perese, D. M., J.A.M.A. 175:75, 1961.

Seven hundred and fourteen patients with histologically proved malignant disease were treated at the pain clinic of Roswell Park Memorial Institute. The various methods of treating the pain of malignant disease and the organic factors responsible for the pain in the aforementioned patients were investigated.

The pain associated with malignant disease ordinarily is not severe, but it is persistent. Although a malignant tumor was suspected because of the prolonged pain, none could not be detected in 12 per cent of the cases investigated. In some cases it took eighteen months or longer to locate the area of malignant change.

The various malignant growths have their own patterns of pain. Uterine carcinoma involves the obturator nerve and the lumbosacral nerve plexus and the symptoms are referable to the distribution of the nerve involved. Rectal carcinoma may act in the same way, but it is more often manifested by vague anal pain. Mammery or pulmonary carcinoma may involve the brachial plexus, causing nerve root pains of the pleura, inducing mild burning or sensations of pulling or pressure. In patients with tumors of the head and neck, pain of any severity occurs only when the mucosa, the periosteum and the individual nerves of the head and neck are involved.

Once a definite diagnosis is made, a course of psychotherapy is outlined and the patients are categorized according to life expectancy; short (under three months), medium (three to twelve months) and long (twelve months to several years).

In the group with short life expectancy, major surgical procedures and irradiation are avoided. Chemical hormonal, vitamin or serum therapy of proved value is prescribed. Minor procedures, such as alcohol blocks, and blocks of the peripheral or the sympathetic nerves, are useful. Narcotic analgesics should be alternated with the non-narcotic types and administered in conjunction with heavy doses of tranquilizers and sedatives.

In the group with medium life expectancy, palliative surgical procedures may be added. Emphasis should be placed on alleviation of the pain by neurosurgical measures.

For patients with long life expectancy, procedures should be utilized as indicated. Non-narcotic analgesics will suffice in the early period. Hormones and chemotherapeutic agents are useful in some cases. Irradiation may also produce temporary remissions.

Neurosurgical procedures, such as nerve block, tractotomy, thalamotomy, hypophysectomy or radio-frequency interruption of the pain tract can be advantageous. Hypnosis is not generally recommended.

The results of the various treatments of 714 patients are tabulated.

MORRIS W. GREENBERG, M.D.

Operative Treatment of Osteoarthritis of the Hip. Ring, P. A., Brit Med. J. 1:827, 1960.

This is a review from Guy's Hospital of 290 operative procedures done on the hip for degenerative arthritis from 1947 to 1956. Results were appraised on the basis of the amount of pain and limitation of activity. The author evaluates arthrodesis, osteotomy, Judet's prostheses, cup arthroplasty and pseudoarthrosis. Arthrodesis gave the best results, although fusion occurred in only two-thirds of the cases. A second attempt at arthrodesis proved difficult and rarely successful. Pain from a fibrous ankylosis, however, rarely became severe. Results of the arthroplasty were quite unpredictable and were classified as approximately equal, i.e., one-third good, one-third fair and one-third poor. With regard to cases of bilateral involvement, the author is convinced that if the surgeon can give the patient one good, strong painless hip by surgical means the second hip may be spared further degeneration and pain. The problem of patients who wait until the hip is stiff and painful before undergoing operation has a great deal to do with the poor end results.

CHARLES A. ROCKWOOD JR., M.D.

Stabilization of the Cervical Spine by Anterior Fusion. Bailey, R. W., and Badgley, C. E., J. Bone & Joint Surg. 42A:565, 1960.

This article deals with the authors' technic of anterior spinal fusion and their experience with this form of treatment in 20 cases. Although their method is extremely valuable, they do not recommend it as a panacea for disorders of the cervical portion of the spine, nor do they employ the anterior approach in every excision of a ruptured cervical disc, despite its occasional recommendation in the literature as a routine measure. In the following situations, however, they prefer it to the posterior approach: (1) when destructive lesions of the body of a cervical vertebra are present, indicating the need of biopsy and fusion; (2) when fracture-dislocation has involved extensive removel of laminae and facets; (3) when fracture-dislocation is associated with maxillofacial injuries that may cause respiratory impairment, and (4) when fracture-dislocation is associated with severe degenerative arthritic changes that may eventually necessitate posterior investigation.

If a fracture-dislocation cannot be accurately reduced, anterior fusion of the cervical vertebrae is contraindicated and posterior fusion should be done.

The authors' operative results, up to the time of writing, indicated that anterior cervical fusion is an excellent means of stabilizing the cervical portion of the spine. The technic they employ is described in meticulous detail and supplemented by clear illustrations.

CHARLES A. ROCKWOOD JR., M.D.

The Principles of Stereotactic Brain Surgery and Its use for the Relief of Intractable Pain. Grant, J. M. F., and Selby, G., Australian New Zealand J. Surg. 30:45, 1960.

The authors discuss the various methods of stereotactic operations on the brain, including instrumentation. The instrument used by the authors is that developed by Riechert and Wolff of Freiburg, Germany, and modified by Riechert and Mundinger. They have used this instrument in more than 120 operations, the majority for relief of Parkinson's syndrome. Using the atlas of brain sections published by Spiegel and Wycis in 1952, they calculated the target point in three dimensions, comparing this with the average measurements in the atlas and using a relation factor between the two brains. A detailed account of their operative procedure is given, including the premedication, the position of the patient, and the

position of the stereotactic apparatus. Visualization of the ventricular system was obtained by lumbar encephalographic study with 120 cc. of air. The corrective factors for roentgen ray distortion in average brain distances are discussed.

Electrode destruction is used, with physiological control of the correct position of the electrode established by an electric stimulator producing 3 C.P.S. waves ranging up to 40 volts across the circuit. If the electrode tip is in the sensory thalamic nuclei, the stimulation may reproduce pain; if it is in the lateral ventricle nucleus of the thalamus, the Parkinson tremor is reproduced. Destruction by electrocoagulation with a diathermy machine having a radio frequency current up to 220 milliamperes, is employed. The lesion is enlarged with a second electrode having a bare tip. The lesion produced consists of a central cavity in a surrounding zone of edema, which accounts for the occasional return of symptoms if too small a lesion is made in obtaining initial relief.

A discussion of Riechert's 17 patients in whose cases lesions were made in the posterior ventral nucleus of the thalamus is presented. Nine of the patients were greatly or entirely relieved of pain; 5 showed temporary improvement; 1 was no better, and 2 became worse. The accuracy required to place a lesion in the subcortical pain centers is much greater than that needed for the relief of Parkinsonism, and the reported instance of complications in the former procedure is much greater. Seven patients have been operated upon by the authors for relief of pain, 5 of them more than 67 years of age; 1 of the 7 died from progressive cardiac infarction 5 days after the operation. Two of the patients reported complete relief of pain; two others were greatly relieved, and the remaining 2 patients obtained moderate relief that allowed them to return to an active existence.

The pathologic picture consisted of the intractable pain of herpes zoster and the thalamic syndrome following thrombosis of the left posterior inferior cerebellar artery. There were 3 patients whose pain was "emotionally elaborated."

The paper closes with an appendix including a detailed summary of the case histories which should be read by everyone considering the use of this procedure for the relief of pain.

DANIEL MCCASKILL, M.D.

Role of the Halo Cell in Cervical Cancergenesis. Ayre, J. A., Obst. & Gynec. 15:481, 1960.

The halo cell of the human cervix represents a stage of a transformation from chronic infection to malignant or premalignant disease, created by increased estrogenic activity, overproduction of cervix mucus, deprivation of oxygen supply the to scar tissue and resultant "virus activation." The halo cell may represent "the transient virus-manifest stage of premalignancy."

The perinuclear halo is a translucent area surrounding the nucleus in cervical cells. The halo is usually large and well developed. It takes no stain. It has frequently a sharp, dark and intense peripheral border. The halo may be circular or irregularly oval, occasionally involving most of the cytoplasmatic envelope and sometimes leaving only a rim of cytoplasm at the periphery.

The grading of cellular disease in scrapings from a cervix showing halo cells is based upon overall manifestations of cellular hyperactivity and atypia. The grading does not depend upon the morphologic features of the halo cells themselves.

In the Cancer Institute at Miami, Florida, halo cells were observed in 47 of 246 patients, of whom 33 were in the "minimal precancer cell complex stage" and all were in the "inflammatory stage with precancerous tendencies."

Patients with normal cytologic structure do not show halo cells. Only 1 of the 41 with beginning carcinoma showed such cells.

Halo cells, therefore, are detected exclusively at the borderline between chronic infection or inflammatory activity and carcinoma, and are extremely early cellular manifestations of premalignancy. They are a sort of link between normal cells and

malignant or premalignant cells. They are caused by some nucleic acid viral infections activity in an estrogenic environment that produces derangement of cellular metabolism.

EGON W. WINTER, M.D.

The Management and Repair of Lesions of the Ureter with Fistula. Weinberg, S. R., Hamm, F. C., and Berman, B., Surg., Gynec. & Obst. 110:575, 1960.

This article reports the experience of the authors in the management of 10 patients with fistula of the ureter. The diagnosis and general management are first discussed. The importance of an attempt at nonoperative management was emphasized by success in 1 case, in which the fistula closed after dilation of the ureter on only one occasion. Nephrectomy was recommended for patients with incurable disease and for those in whom the kidney had been damaged so severely as to preclude return to proper function.

Tying the ureter in the hope of silent atrophy of the involved kidney is condemned, since it can lead to serious trouble. Reconstructive surgical intervention is the preferable treatment and ureteroneocystostomy the procedure of choice, since in the presence of a ureteral fistula the lower segment has been involved in dense scar tissue, making end-to-end anastomosis impossible. The authors have used such modifications as the construction of an elongated vertical vesical tube flap or the preparation of an isolated segment of small bowel to act as a substitute ureter. The senior authors have been pioneers in doing plastic operations on the kidney, pelvis and ureter without splinting. They have performed ureteroneocystostomy on 6 patients, with elimination of splints and diversion ureterotomy. They emphasize four cardinal principles: (1) avoid interference with the blood supply of the ureter; (2) avoid tension; (3) maintain drainage from the operative site for at least ten to fourteen days, and (4) eliminate stasis of urine about the anastomosis by means of a vertical linear ureterotomy of the anastomosis. They have demonstrated that such an incision leaves the ureter quiescent, with infrequent peristaltic contractions of low amplitude, until healing is complete. According to the authors, this technic obviates the necessity of intubating the ureter with a catheter.

The authors are to be commended for their courage in adopting this new technic, but statistically final conclusions cannot be drawn because of the small number of cases involved.

CARL K. PEARLMAN, M.D.

Experiences with Angiography as a Guide to Mediastinal Exploration. Kincaid, O. W., Brandenburg, R. O., and Bernatz, P. E., J.A.M.A. 173:613, 1960.

Fluoroscopic examination often fails to differentiate between a pulsatile mediastinal mass and one that is transmitting a pulsation. Angiographic and thoracic aortographic studies offer an accurate means of identification.

Most often, in the authors' series of 200 patients at the Mayo Clinic they utilized 70 per cent Urokon (1 cc. per kilogram of body weight). Twenty to 25 cc. will usually demonstrate the superior vena cava and the right side of the heart.

In case the angiocardiogram fails to define the lesion, the authors use the retrograde aortographic technic. Cutdown of the femoral or radial artery is performed, and a cardiac catheter is passed to an appropriate level. Either the left anterior oblique or the lateral position gives the best picture. Up to 50 cc. of opaque medium is given with a pressure injector over two or three seconds.

Twelve assorted clinical cases are reported, with illustrations. Of the various methods utilized, angiographic and thoracic aortographic studies gave 100 per cent accurate results, as compared with 28 per cent for fluroscopic and 6 per cent for bronchoscopic examination. Ten patients in the series, examined tomographically, had an accuracy percentage of zero.

Angioaortographic studies have been shown to be safe and accurate and will play an increasingly important role in thoracic surgery.

SIDNEY KASE, M.D.

Brewster Countersink Operation. Costigan, D. G., Riley, J. M. Jr., and Coy, F. E. Jr., J. Kentucky State M. A. 58:596, 1960.

The Brewster operation has been criticized as technically difficult and also because displacement of the talus was too frequently a complication.

The author is convinced that he has overcome these objections. He suggests (1) that the operation be limited to the so-called flail foot; (2) that a staple be used to hold the talus in such a countersunk position that it will allow 90 degrees of dorsiflexion and 20 of plantar flexion, and (3) that a triple arthrodesis (talonavicular, subtalar, calcaneocuboid) should complete the operation.

He claims that these modifications result in a good gait, with adequate stability.

RAYMOND LARICHELLIÈRE, M.D.

Studies on Abdominal Organ Perfusion for Cancer Chemotherapy. Shingleton, W. W., Reeves, J. W. Jr., Keppel, R. A., Mahaley, S., and Temple, H. M., Ann. Surg. 151:741, 1960.

Approximately 40 per cent of fatal neoplasms occur in abdominal viscera. This report describes studies conducted in the development of a technic for isolated abdominal visceral perfusion. Dogs were used as experimental animals. Isolated perfusion of the liver, with and without hypothermia, was carried out, as was isolated perfusion of each of the abdominal and pelvic viscera. The different technics employed by the authors are described.

Various alkylating agents were used. The complication chiefly to be guarded against was anoxic damage to the spinal cord.

Most experimental series in which dogs were used have indicated that the maximum permissible operating time after the thoracic portion of the aorta has been cross-clamped is thirty minutes. In order to increase this time a number of expedients have been employed, including hypothermia, a bypass of oxygenated blood to the area and cross-clamping of the inferior vena cava.

Nitrogen mustard is apparently toxic to nerve tissue. Oxygen potentiates the antitumor action of the alkylating agent. The authors suggest a flow rate in man of 25 to 30 cc. per kilogram per minute.

Leakage of the drug into the systemic circulation, as well as the drug's effect on bone marrow, is now being studied by the authors. Their experience indicates that hypothermia protects the bone marrow and that the use of heat in the area perfused increases the effect of anti-tumor drugs.

JOSEPH BERKE, M.D.

An Approach to the Problem Of Early Simple Glaucoma. Weaver, R. G., North Carolina M. J. 21:145, 1960.

Early simple glaucoma is defined by the author as a condition in which there is: (1) an intraocular pressure of no more than 30 mm. of mercury as measured (Schiotz); (2) minimal field changes or none, due to glaucoma, and (3) an open filtration angle.

The criteria presented are necessarily arbitrary, but they clearly establish a practical approach to the recognition of glaucomatous disease before visual loss has occurred.

Dr. Weaver's "routine examination" consists of (1) recording of the patient's history (especially family history of glaucoma); (2) ophthalmoscopic study (specific sketches of the optic disc are made for subsequent comparison); (3) tonometric study, and (4) tachystoscopic study of the visual fields.

If the results of any of these examinations suggest glaucoma, a second group of definitive tests is performed: (1) study of the visual fields on the tangent screen; (2) tonographic investigation, and (3) gonioscopic tests.

If both groups of studies reveal that conditions are within normal limits, a combined water-drinking provocative tonographic test is indicated. The baseline tension is recorded; the patient is given 1,000 cc. of water to drink, and the ocular tension is measured every fifteen minutes thereafter. At the end of forty-five minutes a tonogram is taken. The result is considered positive if there is (1) a rise in intraocular pressure of 8 mm. of mercury or more; (2) a rise in intraocular pressure to three scale readings or less on the Schiotz tonometer, or (3) a significant change in the tonogram.

The ratio of the initial pressure divided by the coefficient of outflow (Po/C), when above 100, is considered abnormal.

The treatment advised by the author follows established practice. Pilocarpine, increasing from 1 per cent to 4 per cent, eserine, carbarnycholine and ephedrine tartrate are the principal ophthalmic solutions recommended. Mention is made of the carbonic anhydrase inhibitiors, e.g. Diamox, and of Scheie's filtering procedure.

The patients are followed at approximately four-month intervals, the appointments being varied from morning to afternoon so that any diurnal variation will be detected.

At each visit the notations concerning the optic discs are compared with earlier data, the condition of the visual fields is recorded by the same examiner, and the tonographic study is repeated. Operation is advised only when there is progressive glaucomatous field loss under "maximum tolerable medicatal therapy." The author interprets "tolerable treatment" as 4 per cent pilocarpine or its equivalent four times a day, 2 per cent levoepinephrine twice a day and Diamox in doses that do not produce intolerable side effects.

ROBERT F. AZAR, M.D.

Acroparesthesiae and Acromegaly. Johnston, A. W., Brit. M. J. 1:1616, 1960.

The syndrome of acroparesthesiae due to compression of the median nerve can be produced by anterior dislocation of the lunate bone or by tumors within the carpal-tunnel, and is associated with such diseases as myxoedema and acromegaly. The authors report their experience with 5 cases of acromegaly associated with the carpal-tunnel syndrome. The incidence of the syndrome in association with acromegaly is equal in the two sexes, whereas the carpal tunnel syndrome occurring without acromegaly affects predominantly the female. The author's operative procedures and the results of necropsy in 1 case indicate that the cause of the syndrome is overgrowth of soft tissue within the carpal tunnel and not to overgrowth of bone.

CHARLES A. ROCKWOOD JR., M.D.

The Mallory-Weiss Syndrome. Abrams, W. W., Am. J. Gastroenterol. 33:574, 1960.

The importance of hematemesis in direct proportion to the amount of blood lost has always given concern. The Mallory-Weiss syndrome described and discussed by the author falls into that category which has, as its cardinal diagnostic points, hematemesis and massive negative results from gastro intestinal series and from tests of the liver. It has been known for a good many years that a normal esophagus may rupture and bleed when repeated vomiting occurs over a period of time. The esophagitis associated with acute ulceration in its lower portion is not infrequently revealed by postmortem examination. This condition has been attributed to the effect of regurgitated gastric contents, and hemorrhage has been associated with this type of lesion. It has been proved that this is the case in animals especially; the esophagus of the cat is extremely vulnerable to regurgitated gastric contents. It is the reviewer's opinion that in a case of pure Mallory-Weiss syndrome there should be no significant symptoms referable to the esophagus or the stomach prior to the onset of bleeding. Passive hyperemia associated with chronic thoracic disease should be considered in eliminating conditions other than true Mallory-Weiss syndrome, as it is conceivable that an esophagus in this condition is not able to withstand intragastric pressure that is even slightly above normal. The advisability of including such in this category, therefore, appears dubious. Fatal hemorrhage from atheromatous blood vessels in these areas has a clinical history of several hundred years. It is understandable that vomiting could facilitate rupture of these vessels. Would the author include cases of this type among cases of the Mallory-Weiss syndrome?

D. C. PETERS, M.D.

Observations Concerning the Significance of Fatty and Fibrous Tissue in Needle Biopsies of the Liver. Hartsock, R. J., and Fisher, E. R., Am. J. M. Sc. 239:103-445, 1960.

Whether fatty changes in the liver are essential to the development of cirrhosis is

debatable. The authors, in order to gain a better understanding of the significance of fatty change and fibrosis of the liver, performed needle biopsies on a group of patients for whom previously diagnosis had been established by this method. Sixteen patients were included in this series. The interval between histologic examinations was two to four years. Seven patients exhibited no change, 6 revealed a quantitative increase and 3 a decrease in fatty changes. The authors concluded that these hepatic alterations may be of therapeutic and pathogenic significance when considered in conjunction with the clinical data.

JOSEPH BERKE, M.D.

Surgical Significance of the Thymus. Boyd, D. P., and Gerard, F. P., New England J. Med. 263:431, 1960.

A review of the surgical aspects of the thymus gland is adequately presented.

Twenty-four thymectomies were performed from 1928 to 1958, and a breakdown of data on malignant versus nonmalignant tumors is reviewed. The clinical manifestations observed in patients with thymic disease are discussed. Various authors are quoted with regard to experience and prognosis.

The association of myasthenia gravis with thymoma and the surgical death rate are reviewed. The roentgenographic features of thymic tumors are described. This outline covers a small number of cases of clinical interest, and the authors' comment on surgical therapy is presented.

R. G. MCCORKLE, M.D.

Chemical Splenectomy. Stuart, A. E., Lancet 2:896, 1960.

Simple fatty molecules exert a profound effort on the sessile cells that remove particulate matter from the blood stream. The author noted that colloidal preparations of ethyl palmitate (Ethpolm), given intravenously to mice caused suppression of phagocytic function and widespread splenic necrosis, of the pulp and of the malpighian bodies. Ethpalm is probably selectively removed by the Kuffer cells of the liver and by the histiocytes of the spleen and the bone marrow. The affinity of Ethpalm for the spleen supports the theory of regional differences in reticuloendothelial function. Owing to the nature of the compound, it is prevented from passing the capillary barrier. The liver is presumably protected by efficient detoxication. The mechanism of action seems to be related to the concentration of Ethpalm within the phagocytes. Minute doses inhibit the function of phagocytes, whereas larger doses destroy them. Bone marrow has few phagocytes; therefore, no adequate concentration of the compound is present to cause damage. Future studies will determine whether this compound is useful in the control of splenic function.

JOSEPH BERKE, M.D.

Antrectomy With Vagectomy or Partial Gastrectomy With or Without Vagectomy for Chronic Duodenal Ulcer. Palumbo, L. T., Sharpe, W. S., Lulu, D. J., Vespa, R., and Colon-Bonet, J., Ann. Surg. 151:367, 1960.

It is the opinion of the authors that antrectomy with vagectomy has provided much better overall results, with lower morbidity and mortality rates, than has partial gastrectomy with or without vagectomy in the treatment of chronic duodenal ulcer.

Even with minimal gastric resection (25 per cent or less), which included most of the antrum, achlorhydria was produced in every patient. This alone should prevent recurrent or marginal ulcer. There has been a definite gain in weight; no undesirable physiologic sequelae have occurred; there is a larger gastric reservoir permitting a normal diet, and only three meals a day are necessary to maintain weight and strength.

Antrectomy with vagectomy is easier to perform than is partial gastrectomy, with or without vagectomy.

The advantages of this procedure are (1) reduced morbidity and mortality rates; (2) accelerated rehabilitation; (3) fewer side effects; (4) shortening of the operating time and the stay in the hospital, and (5) minimal chance of marginal or recurrent ulcer formation.

E. G. LINHARDT, M.D.

IMPORTANT ANNOUNCEMENT

Contributors of scientific articles for publication in The Journal of the International College of Surgeons from Europe, the Near East and the Middle East should send their articles to:

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